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Evaluation of Metals Release from Oxidation of Fly Ash during Dredging of the Emory River, TN

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Abstract: This report describes a study examining the effects of Kingston Fossil Plant fly ash on geochemistry, water quality, and aquatic biota relevant to the Emory River in Tennessee. It focuses on the processes specific to the changes in the fly ash chemistry and potential releases as a result of a spill that occurred on December 22, 2008 and the subsequent dredging operations to remove the fly ash from the Emory River. Fly ash from three sites including the original pile, fly ash spilled in the Emory River, and dredged fly ash from the sluice channel were evaluated to assess the potential for metal releases. Fly ash from the Emory River and sluice channel were used to prepare relevant suspensions (e.g., elutriates) to represent extreme conditions for the release, dissolution, and metal speciation changes that might occur during dredging. Advanced chemical assessment techniques were used to quantify the chemical concentrations and speciation in this system. Because multiple metals were present, biological studies were also conducted to assess the potential for toxic effects and uptake in aquatic organisms. Chemistry results from this study were compared to measurements from ongoing monitoring at the site.

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Executive Summary

This report describes a study examining the effects of Kingston Fossil Plant fly ash on geochemistry, water quality, and aquatic biota relevant to the Emory River in Tennessee. It focuses on the processes specific to the changes in the fly ash chemistry and potential releases as a result of a spill that occurred on December 22, 2008 and the subsequent dredging operations to remove the fly ash from the Emory River. Fly ash from three sites including the original pile, fly ash spilled in the Emory River, and dredged fly ash from the sluice channel were evaluated to assess the potential for metal releases. Fly ash from the Emory River and sluice channel were used to prepare relevant suspensions (e.g., elutriates) to represent extreme conditions for the release, dissolution, and metal speciation changes that might occur during dredging. Advanced chemical assessment techniques were used to quantify the chemical concentrations and speciation in this system. Because multiple metals were present, biological studies were also conducted to assess the potential for toxic effects and uptake in aquatic organisms. Chemistry results from this study were compared to measurements from ongoing monitoring at the site. The following conclusions were made based on the results of the study:

Chemical characterization of elutriate

- Fly ash collected from three locations (original source pile, the Emory River, and sluice channel) contain elevated concentrations of several metals relative to local soils and sediments, including arsenic, selenium, and barium.
- Fly ash has been modified by its residence in the Emory River in the following ways:
 - Net carbon and nitrogen profiles changed to represent accumulated natural organic matter present in the river.
 - Manganese in the source pile transformed from an oxidized to reduced state. Iron species were stable as Fe(III) oxides, and did not change.
 - Approximately 30 to 50 % of total selenium transformed from selenite (Se(IV)) to more reduced Se species after the ash was deposited in the river. Naturally forming organoselenium, present

- as Se(II), may be among these reduced forms. No evidence of selenate was found in the Emory River ash or the sluice channel.
- Fly ash arsenic remained predominantly as As(V), with evidence of some slight shift to reduced arsenic-thiol species.
- Selenate was only found in the waters collected from the stilling pond. Given that selenate was not detected in any of the systems preceding the stilling pond, it can be hypothesized that selenium is photo-oxidized due to the exposure of surface waters to direct sunlight. More investigations are warranted to resolve this mechanism.

Chemical characterization of fly ash

- Increased dissolution of several elements (e.g., As, Ba, V, Se) was observed over the 10-day effluent elutriate test, while dissolved Mn concentrations decreased. Even though system redox remained relatively stable, it was demonstrated that fly ash Mn was partially oxidized by extensive oxic regime treatment. Iron phases were unaffected. The one order of magnitude increase in dissolved organic carbon over the effluent elutriate test suggests the experimental conditions promoted microbial activity.
- With the exception of Mn, bulk metal(loid) speciation remained relatively constant over the 10-day period. The major exception to this observation came from μ -XANES (micro-X-ray near edge structure) spectroscopic analysis showing a domain of selenate in Emory River elutriate solid after the 10-day air bubbling period, even though selenate was not detected in solution. It is unclear whether this domain was caused by the elutriate conditions or existed before the experiments were performed. However, the results do open up the possibility that extensive oxidation of the system can produce selenate. Geochemical modeling confirms that the Emory River conditions represent a lower boundary where selenate is thermodynamically stable in this system, although a relatively minor species relative to selenite.
- Given that both the anoxic and oxic regime (nitrogen- and air-bubbled) systems displayed nearly identical behavior, it is hypothesized that the trend in the dissolution of metals over the 10-day period was due to the extended agitation of the fly ash. The corresponding spike in microbial activities supports the view that constantly dispersing the fly ash enhances the microbial bioavailability to surface-adsorbed nutrients.

Biological characterization

- No statistically significant adverse effects were observed for larval or juvenile fish exposed to the oxic regime elutriates prepared with fly ash from the Emory River. Histological analysis of the gills was inconclusive, and no effect was found on juvenile mussel survival.
- Dissolved As, Ba, Cr, Hg, V concentrations in the oxic regime elutriate were below the chronic water quality criteria and/or relevant literature or screening values.
 - Dissolved concentrations of As, Cr, and Hg were below the criterion continuous concentration (CCC).
 - Ba and V concentrations were lower than literature toxicity reference values.
 - While the dissolved concentrations of Se measured in the Emory River elutriate (5.4 µg/L) and the sluice elutriate (12.7 µg/L) exceeded the CCC = 5.0 µg/L for total Se, it is generally understood that tissue residues are more predictive of Se toxicity than are water concentrations (U.S. Environmental Protection Agency (USEPA) 2004).
- In general, concentration of metals in tissues increased in a dose-dependent manner. However, this increase is likely due to metals present in the gut as ingested fly ash, not metals integrated into the tissue.
 - Arsenic (As) was near reference values reported in the literature at which effects are observed. However, this was a conservative assessment because the less toxic arsenate (As(V)) dominated in the oxic regime elutriates, but the levels in water were compared to screening values derived for the more toxic arsenite (As(III)).
 - There was very little literature data and no screening values to compare barium (Ba) concentrations in tissues.
 - Chromium (Cr) was present as Cr(III) and at concentrations near the no observable effects residue (NOER) from literature studies.
 - Mercury (Hg) and selenium (Se) concentrations in tissues were below relevant screening values.
 - Vanadium (V) exceeded literature-based screening values, but the elevated concentrations are likely the result of fly ash in the gut.

- In a weight of evidence approach where chemistry, toxicity, and bioaccumulation data are integrated, these results suggest little potential for toxicity to related fish species given the extreme conditions represented by oxidized elutriates in this study.
- Several areas of uncertainty could be addressed through additional data collection including longer-term exposures of fish to suspended or bedded fly ash, assessing food web exposure or trophic transfer, and evaluation of sensitive species not assessed in this study.

Comparison to field conditions

- The elutriate experiments performed in this study used mixing times well beyond established elutriate procedures for the purpose of assessing potential shifts in metal speciation when fly ash contaminants are released to the water environment. The exaggerated terminal mixing times (10 days) produced elutriates that overestimate total dissolved metal concentrations for the dredge plume and the ash settling/stilling pond effluent, compared to those observed by TVA's field monitoring program for the plume and stilling pond.
- Suspended solids and metal concentrations decline significantly at the monitoring station immediately downstream of the dredging operation.
- Dissolved metals account for much of the total metal concentrations observed in the pond effluent, plume, and river monitoring stations, largely because of the relative low suspended solids concentration. This suggests that the small suspended particulate source limits further dissolved metal desorption in the water column, but that most of the metal constituents present in the water column are mobile and subject to downstream transport.
- Results of the field monitoring program should be closely observed for deviations from the trends observed to date. Increased dredge production rates may increase contaminant releases at the dredge, as well as increase flow rates through the settling ponds, reducing retention time and impacting the effectiveness of the settling pond system in retaining suspended solids and contaminants. Cumulative effects of dredging operations over time may also affect water quality through deposits of erodible solids downstream of the dredge and solids buildup in the settling ponds.

Preface

This report was prepared through a research effort funded by the Tennessee Valley Authority. It describes the results of research focusing on the geochemistry, water quality, and aquatic biota following the Kingston Fossil Plant spill on December 22, 2008. The research effort was conducted and the report prepared by Dr. Jeffery Steevens, Dr. Anthony J. Bednar, Dr. Mark A. Chappell, Alan J. Kennedy, Dr. Jennifer M. Seiter, Dr. Jacob K. Stanley, Daniel E. Averett of the Environmental Laboratory (EL), U.S. Army Engineer Research and Development Center (ERDC). The authors acknowledge support provided by Jonathan Burr and Paul Schmierbach from the State of Tennessee, Department of Environment and Conservation, with sampling design and collection. The authors would also like to thank reviewers from the U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, Tennessee Valley Authority, and State of Tennessee for providing constructive review of this report.

This report was prepared under the U.S. Army Corps of Engineers' Dredging Operations and Environmental Research (DOER) Program and Dredging Operations Technical Support (DOTS) Program, for which Dr. Todd S. Bridges serves as Program Manager. Dr. Beth Fleming was Director, EL. COL Kevin J. Wilson was Commander and Dr. Jeffery P. Holland was Director.

Unit Conversion Factors

Multiply	By	To Obtain
cubic yards	0.7645549	cubic meters
degrees Fahrenheit	$(F-32)/1.8$	degrees Celsius
feet	0.3048	meters
miles (nautical)	1,852	meters
miles (U.S. statute)	1,609.347	meters
ounces (mass)	0.02834952	kilograms
pints (U.S. liquid)	0.473176	liters

Acronyms

ACR – acute-to-chronic toxicity ratio, used to derive chronic no-effect concentrations

AF – application factor, used to derive chronic no-effect concentrations; or, adult fish (when used in identifying exposure regimes)

APHA – American Public Health Association

CAMD – the J. Bennett Johnston Sr. Center for Advanced Microstructures and Devices in Baton Rouge, LA

CCC - Criterion Continuous Concentration – chronic water quality criterion (WQC) for the protection of aquatic life

CDF – confined disposal facility – a structure designed to receive sediments dredged from a navigation channel and safely contain the contaminants

d – duration, in days, of the toxicity exposure

DCM – double-crystal monochromator – an optical device that can be used in spectrophotometry

DRET – dredging elutriate test

EC50 – the median effects concentration – represents a modeled concentration that has a biological effect (e.g., growth, reproduction, etc.) on 50% of the test subjects

EET – effluent elutriate test

EFL – effluent from settling pond (used to identify samples or exposure regimes)

EL – elutriate (used to identify samples or exposure regimes)

EMR – Emory River (used to identify samples or exposure regimes)

ER – effects residue (see ER50)

ERED – the Environmental Residue Effects Database provided by the U.S. Army Corps of Engineers (<http://el.erdcl.usace.army.mil/ered/>)

ER50 – the median effects residue – represents a modeled tissue residue at which 50% of the test subjects show a biological effect (e.g., growth, reproduction, etc.)

ERDC – U.S. Army Engineer Research and Development Center

FA – fly ash (used to identify samples or exposure regimes)

GPS – global positioning system

h – duration, in hours, of the treatment

HDPE – high-density polyethylene, a type of plastic that is hard and opaque

HPLC – high-performance liquid chromatography – analytical method for detecting and quantifying compounds of interest

ICP-AES – inductively coupled plasma atomic emission spectroscopy – analytical method for detecting trace metals

ICP-MS – inductively coupled plasma mass spectrometry – analytical method for detecting and quantifying a range of compounds of interest

kg – kilogram, a unit of mass equal to one thousand grams

L – liter, a unit of volume

LC50 – the lethal median effects concentration – represents a modeled concentration that kills 50% of the test subjects

LF – larval fish (used to identify exposure regimes)

LOEC – lowest observable effect concentration – represents the lowest concentration at which an adverse biological effect was observed

LOER – lowest observable effect residue – represents the lowest tissue residue at which an adverse biological effect was observed

LR50 – the lethal median effects residue – represents a modeled tissue residue at which 50% of the test subjects die

MATC – maximum allowable toxicant concentration – a concentration assumed not to be toxic. This is usually derived as the geometric mean of the NOEC and LOEC and is better suited for application to chronic toxicity test data.

MCL – maximum concentration level – usually applies to drinking water standards

mg – milligram, a unit of mass equal to one thousandth of a gram

MPC – maximum permissible concentration (see MATC)

MS – mass spectrometry, a general analytical method for detecting and quantifying compounds; or, mussel (when used in identifying exposure regimes)

mV – millivolt, a unit of voltage or electric potential difference equal to one thousandth of a volt

NA – not available

ND – not detected by analytical methods

NEXAFS, C-NEXAFS – near-edge X-ray absorption fine structure, carbon near-edge X-ray fine structure – specific spectroscopic methods for studying compounds of interest

NOEC – no observable effect concentration – represents the highest concentration at which no adverse biological effect was observed

NOER – no observable effect residue – represents the highest tissue residue at which no adverse biological effect was observed

NSLS – National Synchrotron Light Source at the Brookhaven National Laboratory in Upton, NY

PIL – fly ash pile (used to identify samples or exposure regimes)

QAPP – quality assurance project plan

RF1, RF2, ... RF6 – References 1 through 6, respectively (used to identify samples)

SD – sediment (used to identify samples or exposure regimes)

SET – standard elutriate test

SLC – sluice channel (used to identify samples or exposure regimes)

SSRL - Stanford Synchrotron Radiation Lightsource at the SLAC National Accelerator Laboratory in Menlo Park, CA

TDEC – Tennessee Department of Environment & Conservation

TEY – total electron yield, response measurement recorded in NEXAFS technique

TIC – total inorganic carbon – the sum of all inorganic carbon species in a solution

TOC – total organic carbon – the sum of all organic carbon species in a solution

TRV – toxicity reference value – a reference exposure level or reference dose used to determine risk to a wildlife receptor, defined for a specific contaminant and species

TSS – total suspended solids, the amount of suspended particulates in a water sample and a measure of water quality

t-TEL – tissue threshold effect level – a tissue concentration, above which adverse biological effects are seen, but below which no adverse effects are seen

TVA – Tennessee Valley Authority

USACE – U.S. Army Corps of Engineers

USCS – united soil classification system

USEPA – U.S. Environmental Protection Agency

UV – ultraviolet, as in ultraviolet radiation – the section of the electromagnetic spectrum between visible and X-ray radiation

VLSPGM – varied-line-space plane-grating-monochromator – an x-ray focusing element used in NEXAFS speciation

WA – water (used to identify samples or exposure regimes)

WOE – weight of evidence – an approach to inference or decision making based upon the plausibility or believability of the available evidence on all sides of a case

WQ – water quality

WQC – Water quality criterion for the protection of aquatic life as defined by the U.S. Environmental Protection Agency or state water quality agency

XANES, μ -XANES – X-ray absorption near edge structure, micro-X-ray near edge structure – a type of spectroscopy for determining metal species in solids

XRF, μ -XRF – X-ray fluorescence, micro-X-ray fluorescence – analytical techniques for mapping elements of interest

μ g – microgram, a unit of mass equal to one millionth of a gram

μ S cm^{-1} – microsiemens, units of electrical conductivity

1 Introduction

On December 22, 2008 over 5,000,000 yd³ of fly ash were released to the Emory River, TN from the Tennessee Valley Authority Kingston Fossil Plant (U.S. Environmental Protection Agency (USEPA) 2009). Remediation and recovery efforts for this event are currently underway. The impact of the release on the river and surrounding area is currently under investigation.

The following results describe the potential effects of fly ash on the geochemistry, water quality, and aquatic biota of the Emory River. The analysis is intended to provide baseline information regarding the potential geochemical and biological impacts from exposure to the fly ash in the Emory River as well as potential impacts of fly ash removal. To address this goal, an elutriate that uses fly ash and waters taken directly from the site was characterized over a 10-day period. The approach used in this study provides significant control over the system and the greatest potential for accurately simulating conditions for contaminant release.

Fly ash was collected from three representative sites: material in its original conditions (Pile), material that has been released into the Emory River, and material that has been dredged and settled in the ash recovery ditch (herein referred to as the Sluice Channel). The sites selected represent the three conditions that may affect the release of metals from the system. In addition, sediment and soils from six sites at least 12 miles upstream of the spill area were used to develop a reference envelope for metals concentrations. Geochemical, physical, and biological properties of the elutriate preparations from the Emory River and sluice channel were determined. The most important physical and geochemical parameters include physical fly-ash characteristics, system oxidation shifts associated with suspension in water, and metal speciation and dissolution into water. These data were used for geochemical modeling of the system. Bioassays were conducted using elutriates prepared from the Emory River and sluice channel fly ash. Two life stages of the fathead minnow, *Pimephales promelas*, and the early life stage of freshwater mussel, *Villosa iris*, were used in the elutriate bioassay.

Table 1. Overview of sample sites and analysis¹.

Sample Collection Site	Chemical and Physical	Larval Fish Bioassay	Adult Fish Bioassay	Mussel Bioassay
Original Storage Pile Material	X			
Emory River Material	X	X	X	X
Sluice Channel Material	X	X		X
Emory River Reference	X			
¹ Note that fish histology and mussel bioassay results were conducted by separate laboratories and are provided as supplemental reports in appendices.				

The goals of this analysis, using the data described, are to determine the following:

- Concentration and species of metals released during the suspension and potential oxidation of fly ash. Concentrations will be directly compared to relevant standards as a conservative screening assessment.
- Biological responses to contaminants, in order to evaluate potential toxic effects.
- Time-dependent release of metals to predict the potential for significant metals release from fly ash particles.
- Physical and chemical parameters to estimate contaminant and particle releases to the Emory River.

2 Sample Collection

All field samples were collected on June 12, 2009 and immediately packed on ice and transported overnight by truck to the US Army Engineer Research and Development Center (ERDC) in Vicksburg, MS. Sample collection data sheets are provided in Appendix A. Sample locations are shown in Figure 1 and coordinates are listed in Table 2. A handheld water quality probe was used to measure pH and redox potential (Beckman Coulter, [phi] 225, Fullerton, CA, USA) as well as conductivity (EcTestr™ 11 Plus, OAKTON Instruments, Vernon Hills, IL, USA) at the sampling sites given in Table 3 at the time of water, fly ash, or sediment sampling to provide information on ambient water quality conditions. Fly ash from the Emory River was collected by boat using a polypropylene (U.S. Food and Drug Administration-approved) shovel in areas where the fly ash was submerged by the river at depths less than 1 m. An initial attempt was made to use a Ponar grab sampler for fly ash collection; however, because the submerged fly ash had developed a crust, an acceptable grab sample using this method was not possible. Therefore, samples were collected

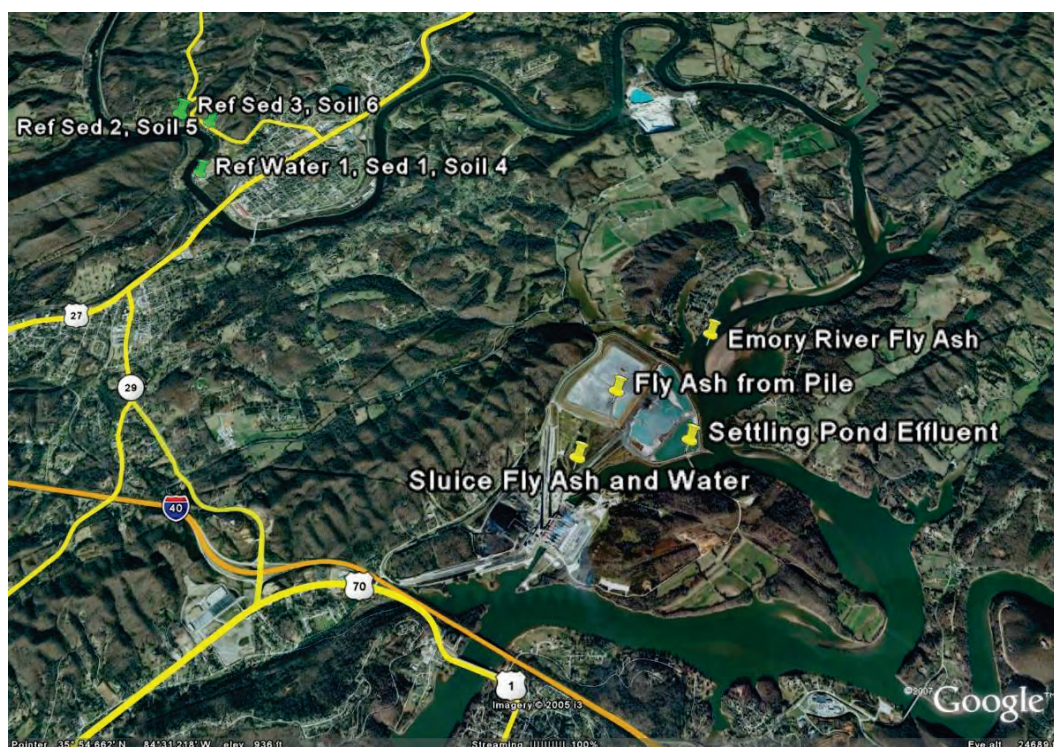


Figure 1. Sampling locations. Ref = Reference water, sediment or soil. Sed = Sediment. Number value is respective reference sample. Map created using Google™ Earth Enterprise Client (CorpsGlobe).

Table 2. Sampling station coordinates.

Sample Description	Latitude / Longitude	
Emory River Fly Ash - Composited Sample # 1	N 35 ° 46.987'*	W 084 ° 31.511'*
Emory River Fly Ash - Composited Sample # 2	N 35 ° 54.877'	W 084 ° 30.163'
Emory River Fly Ash - Composited Sample # 3	N 35 ° 54.855'	W 084 ° 30.165'
Emory River Fly Ash - Composited Sample # 4	N 35 ° 54.858'	W 084 ° 30.155'
Emory River Fly Ash - Composited Sample # 5	N 35 ° 54.845'	W 084 ° 30.145'
Reference Water, Reference Sediment 1	N 35 ° 55.995'	W 084 ° 33.554'
Reference Sediment 2	N 35 ° 56.394'	W 084 ° 33.566'
Reference Sediment 3	N 35 ° 56.448'	W 084 ° 33.793'
Reference Soil 4 - Composited Sample # 1	N 35 ° 56.009'	W 084 ° 33.560'
Reference Soil 4 - Composited Sample # 2	N 35 ° 56.012'	W 084 ° 33.571'
Reference Soil 4 - Composited Sample # 3	N 35 ° 56.007'	W 084 ° 33.565'
Reference Soil # 5	N 35 ° 56.394'	W 084 ° 33.566'
Reference Soil # 6	N 35 ° 56.448'	W 084 ° 33.793'
Sluice Channel Fly Ash	N 35 ° 54.192'	W 084 ° 31.020'
Sluice Channel Water	N 35 ° 54.192'	W 084 ° 31.016'
Stilling Pond Effluent (Water)	N 35 ° 54.279'	W 084 ° 30.363'
Fly Ash from Pile - Composited Sample # 1	N 35 ° 54.550'	W 084 ° 30.770'
Fly Ash from Pile - Composited Sample # 2	N 35 ° 54.586'	W 084 ° 30.769'
Fly Ash from Pile - Composited Sample # 3	N 35 ° 54.604'	W 084 ° 30.811'
*Emory River Fly Ash Composite #1 is likely an incorrect reading from GPS instrumentation. The correct location is in close proximity to the other four sample locations.		

Table 3. Field WQ measurements.

Sampling Site	pH	Conductivity ($\mu\text{S cm}^{-1}$)	Redox Potential (mV)
Emory River	6.96	120	296.0
Reference Site 1	6.81	90	267.8
Reference Site 3	6.70	90	109.8
Sluice Channel	7.95	Not Measured	135.0
Stilling Pond Effluent	8.59	300	12.9

using the polypropylene shovel to a depth of at least 15 cm. Samples were taken from five discrete locations (Table 2) approximately 2.2 miles upstream of the confluence of the Emory and Clinch Rivers near N 35° 54.877', W 084° 30.163' in an area where ash removal by hydraulic dredging was occurring. These five samples were composited, homogenized by mixing with a polypropylene shovel until visually

homogenous, and passed through a 1.25-cm sieve to remove any large debris from the samples. The homogenized samples were placed into two 18.9-L plastic buckets.

Reference water for use in preparing elutriates and in toxicity studies was collected from the Emory River at least 12 miles upstream of the Kingston Fossil Plant site (N 35° 55.995', W 084° 33.554'). This water was collected using an electric pump at approximately 0.75 m depth at a 1.5-m-deep site located approximately 7.6 m from the shoreline. The pump and associated hoses were flushed with site water for 15 minutes prior to sampling. Water was held in 208-L high-density polyethylene (HDPE) drums. Bags of ice were packed around the exterior of the drums for transportation to ERDC.

Reference sediment and soil were also collected within 50 m of the site at which the reference water was collected by HDPE shovel (four discrete samples that were composited) and handheld coring device (three discrete samples that were composited), respectively. Composites were collected using three or four locations rather than the five originally described in the Quality Assurance Project Plan (QAPP) (U.S. Engineer Research and Development Center (ERDC) 2009) due to time constraints. Additional reference sediment and soil composite samples were similarly collected further upstream at the following coordinates: N 35° 56.394', W 084° 33.566' and N 35° 56.448', W 084° 33.793', for a total of three reference sediment samples and three reference soil samples, all placed in 1-L HDPE bottles.

Fly ash and water samples were taken from the sluice channel (N 35° 54.192', W 084° 31.020'). In previous TVA reports, this part of the channel has been described as the ash ditch. The water was sampled using the same electric pump as used for the reference site water, which was flushed with sluice channel water prior to sample collection. Sluice channel water was collected in 16-L cubitainers and packed in coolers with ice for transportation. Fly ash was sampled from the bottom of the sluice channel at a depth of approximately 3 m, using an excavator, and then placed in an 18.9-L plastic bucket for transportation to ERDC.

Samples of fly ash were also collected from the top of the fly ash pile. Three composite samples were taken using a hand sediment corer at N 35° 54.550', W 084° 30.770', N 35° 54.586', W 084° 30.769', and N 35° 54.604', W 084° 30.811'. Three composite samples were taken instead of

the five listed in the QAPP due to difficulty in penetrating the pile's surface with the sediment corer and time limitations. At each sampling site, the upper 5 cm of substrate was scraped away prior to sampling to remove the stabilizer added to the pile, and sediment cores were taken at a depth of 0.5 m. These samples were composited, homogenized, and placed into three 1-L HDPE bottles. Water samples of the effluent of the stilling pond were taken just prior to entry into the weir leading to the Emory River (N 35° 54.279', W 084° 30.363'). These were grab samples, taken just under the water's surface. Two replicate grab samples were taken in 1-L HDPE bottles.

3 Extended Elutriate Preparation

Environmental concerns for dredging projects are often directed toward releases of contaminants from the sediment to the receiving waters at the point of dredging and at the point of disposal. Compliance with water quality standards and protection of aquatic organisms are frequently issues for dredging projects, particularly when the sediments are contaminated. Dredging releases are related to the dredge head's mechanical movement and cutting action, which propel sediment particles and interstitial water into the water column and generate a plume of suspended sediment and associated contaminants. Contaminant releases may occur during discharge of sediment from a dredge pipeline into the water column, emptying a barge or hopper of sediment into the water column, or effluent from a confined placement site following sedimentation to remove most of the solids.

The US Army Corps of Engineers has developed laboratory elutriate tests to estimate contaminant releases from each of these pathways. The *Upland Testing Manual* (USACE 2003) defines elutriate as "A sample generated by washing contaminants from a sediment sample using water, usually by mixing water with the sediment, allowing the sediment to settle, and extracting the sample from the overlying water." Elutriate procedures have been developed to simulate the point of dredging, open water disposal, and confined placement or disposal facility effluent. Sediment elutriates may also be prepared for biological effects testing. The primary differences in the tests are associated with mixing time, settling time, and solids-to-water ratio or solids concentration as shown in Table 4. The tests are listed in chronological order of their development.

The two pathways of concern for the Kingston Dredging Operations are releases at the dredging site and effluent from the sluice and stilling pond system. Consequently, the EET and the DRET procedures should most closely replicate the dredging operations currently associated with cleanup operations. However, due to specific information available on total solids loads in the sluice channel, the laboratory protocols were modified for this study, as well as to investigate the effects of longer-term aeration and oxidation on metal speciation and dissolved metal releases to the water column. One of the specific concerns raised for the dredging of

Table 4. Elutriate Test Conditions.

Test Name	Purpose	Solids:Water	Mixing Time	Settling Time	Reference
Standard Elutriate Test (SET)	Open water disposal (dissolved contaminants)	1 part sediment to 4 parts water by volume	0.5 hr	1.0 hr	USEPA/ USACE (1998)
Effluent Elutriate Test (EET) (formerly named Modified Elutriate Test)	Confined disposal facility (CDF) effluent (particulate and dissolved contaminants)	CDF influent concentration Default: 150 g dry sediment solids per liter elutriate	1.0 hr	CDF retention time Default: 24 hr	USACE (2003)
Dredging Elutriate Test (DRET)	Point of dredging (particulate and dissolved contaminants)	1 to 10 g dry sediment solids per liter elutriate	1.0 hr	1.0 hr	Palermo et al. (2008)

fly ash is whether or not introduction of oxygenated water into the fly ash slurry will result in oxidation and release of metals, particularly selenium. Therefore, the elutriate procedure developed for the current work uses an extended aeration time, far in excess of aeration times occurring in the dredging operation to answer the question of metals release once exposed to oxic conditions.

For the current investigations, the elutriate tests were created following slight modifications of the DRET procedure outlined above. Fly ash samples were homogenized in the laboratory prior to subsampling from sample containers. Specifically, 10 g (wet weight) of fly ash material was added per liter of Emory River or sluice channel water to create the elutriate mixture. The Emory River fly ash sample was 53% solid material, and therefore, the elutriate sediment load is calculated to be approximately 5.3 g/L. The sluice channel fly ash sample was 73% solid material, and therefore the elutriate sediment load is calculated to be approximately 8 g/L (accounting for the total solids of the sluice channel water of ~0.7 g/L). These loading values are in line with historical solids loads measured during dredging operations at the site. Monitoring data available from TVA indicates TSS at this location ranged from 69 to 17,100 mg/L with an average value of 5,000 mg/L, and median value of 606 mg/L.¹ Additionally, all elutriate experiments were performed in triplicate. Furthermore, to test the effect of redox potential on the release and speciation of metals from the fly ash, two redox systems were tested, one oxic, created by bubbling the elutriate mixture with humidified air, and one anoxic, created by bubbling the

¹ Personal Communication. July 23, 2009. M. Houck, Engineer, Jacobs Engineering, Oak Ridge, TN.

elutriate mixture with humidified nitrogen, for 10-day experiments. Increased water vapor in the air and nitrogen used for bubbling the elutriates was needed to prevent evaporative concentration of the elutriates over the 10- day experiment. The nitrogen bubbling treatment did not result in completely anoxic conditions. The two redox systems will therefore be referred to as the anoxic regime (nitrogen-bubbled) and the oxic regime (air-bubbled).

Elutriates for the sluice channel oxic and anoxic regime experiments were prepared in 19-L HDPE containers. Emory River anoxic regime elutriates were also prepared in 19-L HDPE containers. However, due to the volume of water needed for the biological tests, Emory River oxic regime elutriates were prepared in 200-L HDPE drums. All elutriate preparations were performed in a 20 °C secured environmental chamber.

Aliquot samples (1-L) were collected from the elutriate preparation containers at 1-, 24-, 48-, 96-, and 240-hr timepoints, allowed to settle for 1 hr following the standard DRET procedure, and the supernatant analyzed for dissolved and total metals, arsenic and selenium speciation, and total organic carbon (USEPA 2007, Bednar et al. 2004, 2009). Redox potential (Eh) and pH were also measured at each timepoint in the bulk elutriate containers prior to collection of the 1-L aliquot. Data sheets for the elutriate preparations with associated water quality data are found in Appendix B.

4 Physical and Chemical Characterization of Fly Ash

Different techniques were used to determine the physical and chemical properties of the fly ash. The purpose was to gain detailed information about the composition and potential changes in the physical and chemical properties of the ash from the original source pile, to the Emory River, and eventually to the sluice channel following dredging. In addition, reference sediment and soil samples were collected at various points upstream of the spill and similarly intensely characterized for comparison.

Methods

Solid phase concentrations of metals in the fly ash and reference materials were determined by Inductively Coupled Plasma Atomic Emission Spectroscopy and Inductively Coupled Plasma Mass Spectrometry following USEPA methods 6010C (ICP-AES) and 6020A (ICP-MS), using a Perkin Elmer Optima 5300DV and Elan DRC-II, respectively. The solids were first dried, ground to pass a #40 ASTM sieve, and acid digested following USEPA method 3050B. The grinding step, though not specified in method 3050B, is a commonly used procedure that has been found to increase analytical precision (Felt et al. 2008). The digestate was filtered through a #41 Whatman filter and diluted to 50 mL with 1 % nitric acid. This digestate was further diluted with 1% nitric acid prior to ICP-AES and ICP-MS analysis as needed, such that the analyte concentrations were within the instrument calibration range. Mercury was determined using cold vapor atomic fluorescence using a PS Analytical Atomic Fluorescence Instrument following USEPA method 7474. Dissolved organic and inorganic carbon was determined using a Shidmadzu TOC-V analyzer using a catalytic combustion technique following USEPA method 9060. (For all methods, see USEPA (2007).)

Factor analysis was conducted using the total elemental data and the StatisiXL statistical software package, as described by Mathangwane et al. (2008). Analysis was performed using a Varimax rotation to avoid data order biases. Number of factors was determined using a Scree test criterion, in which factors with eigenvalues < 1 were ignored.

Known arsenic, selenium, and chromium species were analyzed as standards to aid in the identification of unknown species within the Kingston site test samples. These standards were analyzed at beamlines 11-2 at the Stanford Synchrotron Radiation Lightsource (SSRL) at the SLAC National Accelerator Laboratory in Menlo Park, CA and at the Double Crystal Monochromator line at J. Bennett Johnston, Sr. Center for Advanced Microstructures and Devices (CAMD) in Baton Rouge, LA. Standards were also tested alongside the experimental spectra at beamlines 2-3 at the SSRL and X27A at the National Synchrotron Light Source (NSLS) at the Brookhaven National Laboratory in Upton, New York. Arsenic was calibrated to 11874 eV using an inline arsenate [As(V)] standard, $\text{Ca}_3\text{As}(\text{O}_4)_2$. Selenium was calibrated using an Se (0) foil, selenite [Se(IV)], and selenate [Se(VI)] standards were analyzed periodically to ensure beamline calibration. Chromium calibration was tested using Cr(III) and Cr(VI) salt standards.

Experimental X-ray absorption near edge structure (XANES) spectroscopy was conducted at the microprobe beamlines X27A at the NSLS and 2-3 at the SSRL, and bulk experimental XANES were collected at beamline 11-2 at the SSRL. The fly ash was desiccated under oxygen (source pile; Emory River and sluice elutriates for 240 hr treated with oxic regime) or nitrogen conditions (sluice and Emory River sediments; Emory River and sluice elutriates for 240 hr treated with anoxic regime) and ground to establish a homogeneous sample. Samples were dried on Mylar film in order to establish a single/thin layer on the film. The Mylar film was analyzed for total metal(loid) content to minimize contamination of the arsenic, chromium, and selenium signals. Samples were prepared directly before arrival at the synchrotron facilities. The Mylar film was used to minimize the effects of beam-induced species reduction.

After collection on beamline X27A, the XANES data and X-ray fluorescence (XRF) maps were analyzed using the X27A Plot program. The X27A Plot was also used in the formation of XRF maps and correlation plots. The XRF maps collected on beamline 2-3 were analyzed using the SMAK microtoolkit. All XANES analysis and metalloid speciation was determined using WinXAS 3.1 and Athena 0.8.051 (Newville 2001, Ressler 1998). Arsenic and selenium speciation was determined by comparing the whiteness and derivative values of the experimental and standard spectra. Where possible, linear combination fitting (LCF) was performed using Athena 0.8.051 (Newville 2001) and Six Pack's Linear Least Squares

Fitting (Webb 2005). An error of about 5-10% is associated with LCF results (Manceau et al. 2002).

Iron and manganese XANES analysis was conducted on samples at the double-crystal monochromator (DCM) beamline at CAMD. Iron and Mn analysis was calibrated using their respective metallic foils. Samples were analyzed in fluorescence mode using a 13-element solid-state detector. XANES data were processed and analyzed as described previously.

Composition of the carbon, nitrogen, and oxygen functional group was investigated by near-edge X-ray absorption spectroscopy (NEXAFS). Measurements were carried out at the varied-line-space plane-grating-monochromator (VLSPGM) beamline at CAMD. Drops of concentrated suspensions (100 mg in 1 mL water) of fly ash samples were deposited on Au-coated silicon wafers, and dried in a dessicator at room temperature to make a thin film of sample. These samples were mounted to a stainless-steel plate and placed into the beamline sample chamber. The pressure at the sample chamber during the measurements was $\sim 3 \times 10^{-9}$ torr, which was obtained after baking (at ~ 100 °C) the chamber overnight. NEXAFS measurements were performed by acquiring the sample current (total electron yield detection). The total electron yield (TEY) NEXAFS spectroscopy experiments were carried out on the VLSPGM beamline with resolution better than 0.2 eV at the C1s edge. The photon energy scale was calibrated for the C 1s- π^* resonance peak using a polystyrene sample (Sigma-Aldrich), which was fixed at 285.4 eV. Sample spectra were I_0 normalized using the total yield of clean gold mesh placed in the incident beam before sample. The incident beam intensity was monitored concurrently by a gold mesh and used to correct the measured spectra. C-NEXAFS spectra were processed using the program Athena from the IFEFFIT software package (Newville 2001). Linear combination fits of the C-NEXAFS spectra were compared to carbon reference standards also analyzed at VLSPGM beamline.

A sequential extraction procedure was also performed on the fly ash materials as a companion analysis to the synchrotron-based speciation analysis. The sequential extraction targets specific geochemical phases (soluble, exchangeable, carbonate, metal oxide, organic matter/sulfide, and residual) to determine what metals are present in each operationally defined phase. This analysis is useful for predicting under what type of geochemical environment metals likely will become mobile (e.g. acid

environments dissolving carbonate-bound elements). The method used was modified from published procedures (Tessier et al. 1979).

Total and dissolved metals in the site waters were determined using Inductively Coupled Plasma Atomic Emission Spectroscopy and Mass Spectrometry (ICP-AES and ICP-MS), following EPA Methods 6010C and 6020A, using a Perkin Elmer Optima 5300DV and Elan DRC-II, respectively (USEPA 2007). Scandium was used as the internal standard during ICP-AES analysis, and rhodium, terbium, and holmium were used as internal standard during ICP-MS analysis to correct for instrumental drift. Oxygen and methane were used as the reaction cell gases for certain elements and isotopes to improve accuracy through removal of polyatomic interferences using the Dynamic Reaction Cell ICP-MS. Arsenic (III) and (V) and selenium (IV) and (VI) were determined using recently developed HPLC-ICP-MS techniques, which use anion exchange to separate the species of interest with elemental specific detection at the $\mu\text{g/L}$ level using the ICP-MS (Bednar et al. 2004, 2009).

Results

Total elemental analysis

Table 5 below lists the concentrations of metals and total organic and inorganic carbon measured in the fly ash samples collected from the Kingston TVA sites. The concentrations of elements measured in the three fly ash samples are elevated compared to the six reference soils and sediments collected from the Emory River area, upstream of the Kingston Fossil Plant. The concentrations of metals measured in the reference materials are listed in Table 6. In general, metals concentrations in the fly ash samples are elevated compared to the six reference soils and sediments, in some cases by an order of magnitude or more (e.g. arsenic, barium, copper, molybdenum, selenium, thallium, and vanadium). Arsenic, barium, selenium, molybdenum and vanadium are noted to be in soluble forms of the fly ash material as described below in the geochemical description of the fly ash, as well as observed to dissolve into the elutriate samples, as well as being measured in the field-collected waters.

Table 5. Concentrations (mg/kg) of metals in fly ash samples from TVA Kingston Fossil Plant.

Analyte	Fly Ash Sampling Location		
	Emory River	Sluice Channel	Storage Pile
	Concentration (mg/kg)		
TOC ¹	44930	16780	51840
TIC ²	170	370	120
Aluminum	30600	29900	18600
Antimony	0.233	0.212	0.145
Arsenic	65.8	76.2	46.9
Barium	655	515	510
Beryllium	7.15	6.03	4.88
Cadmium	0.576	0.631	0.272
Calcium	9090	6510	6780
Chromium	48.7	49.2	33.5
Cobalt	25.6	23.1	16.9
Copper	84.1	76.4	50
Iron	17700	22200	17500
Lead	36.4	33.1	20.2
Magnesium	2780	2380	1940
Manganese	153	187	88.7
Mercury	0.0732	0.0294	0.0279
Molybdenum	4.04	4.23	3.2
Potassium	4690	4890	2760
Nickel	52.6	49.9	34
Selenium	6.97	6.08	5.44
Sodium	709	608	482
Silver	0.426	0.335	0.22
Thallium	2.19	2.04	1.35
Vanadium	133	124	86.2
Zinc	77.4	72.1	41.5
¹ Total organic carbon.			
² Total inorganic carbon.			

Table 6. Concentrations (mg/kg) of metals in reference samples upstream from TVA Kingston Fossil Plant.

Sample	RF-1 (Sed)	RF-2 (Sed)	RF-3 (Sed)	RF-4 (Soil)	RF-5 (Soil)	RF-6 (Soil)
Analyte	Concentration (mg/kg)					
TOC	18920	19370	3490	27400	69560	41850
TIC	<0.1	<0.1	260	760	4930	1480
Aluminum	4650	4950	4040	8560	15100	6070
Antimony	0.0262	0.292	0.0162	0.0201	0.05	0.0236
Arsenic	1.71	2.69	1.91	2.42	10.9	3.15
Barium	48	73.5	33.6	100	118	56
Beryllium	0.584	0.528	0.496	0.87	1.51	0.707
Cadmium	0.0991	0.111	0.0971	0.248	0.208	0.117
Calcium	1800	2440	6150	6860	14200	7320
Chromium	8.25	8.33	9.11	13	27.9	11.1
Cobalt	7.01	6.16	6.27	8.76	9.92	8.41
Copper	5.58	5.33	5.49	10	24	7.59
Iron	7990	10600	8670	10900	39600	10900
Lead	6.68	9.06	9.33	16.8	45.3	12.9
Magnesium	674	566	1130	1700	2070	1610
Manganese	313	233	209	724	518	453
Mercury	0.0211	0.0239	0.0110	0.0395	0.0875	0.0221
Molybdenum	0.255	0.273	0.224	0.28	1.03	0.284
Potassium	760	633	782	1080	1910	1060
Nickel	11.5	9.96	12.4	15	16.9	14.8
Selenium	0.247	0.271	0.114	0.757	1.48	0.473
Sodium	52	66.1	48.3	49.9	182	54.1
Silver	0.0593	0.078	0.0805	0.104	0.172	0.0667
Thallium	0.0776	0.103	0.0595	0.131	0.297	0.0947
Vanadium	9.16	9.95	8.33	15.6	33.8	12.8
Zinc	35	31.9	61.2	63.1	64.8	50.5

Multi-linear regression analysis was limited in showing relationships among ash constituents, so multivariate factor analysis (using the Scree test criterion) was employed to show the basic structure of the data through interdependent relationships of the ash constituents (Mathangwane et al. 2008). The factor analysis of the ash was limited by the size of the data set,

but still allowed for some structural determination in the ash data between two different factors (Table 7). In general, hard cations were highly loaded with Factor 1 (except potassium, but significant as loading > 0.5), while remaining soft cations (i.e., metals) were highly loaded in Factor 2, with the exception of silver and selenium. Some metals were highly loaded in both factors; differences would be discriminated with a larger data set. Note that arsenic and manganese are both highly loaded on Factor 2 while selenium and vanadium are significantly loaded in Factor 1. Note also that TOC is highly loaded in Factor 1 while TIC is loaded in Factor 2.

Table 7. Varimax-rotated factor loadings for elemental quantities from Tables 5 and 6. The number of factors was determined using the Scree test criterion.

Ash samples			Ash samples and reference soils/sediments		
Variable	Factor 1	Factor 2	Factor 1	Factor 2	Factor 3
TOC	-0.938	-0.347	0.111	-0.824	-0.081
TIC	0.207	-0.978	-0.289	-0.950	0.008
Al	0.848	-0.529	0.955	-0.281	-0.029
Ca	-0.077	-0.997	0.190	-0.930	0.124
Fe	0.876	0.483	0.231	-0.907	-0.138
Mg	0.539	-0.842	0.768	-0.513	0.223
K	0.913	-0.408	0.971	-0.195	-0.059
Na	0.569	-0.823	-0.003	0.049	0.980
Sn	0.741	-0.671	-0.136	0.072	0.965
Ba	0.048	-0.999	0.970	-0.064	-0.102
Be	0.522	-0.853	0.984	-0.098	-0.107
Cd	0.935	-0.355	0.957	-0.127	0.139
Mn	0.988	-0.158	-0.518	-0.361	0.737
Hg	0.047	-0.999	0.282	-0.862	0.116
Cr	0.860	-0.510	0.939	-0.326	-0.081
Co	0.705	-0.709	0.986	-0.129	-0.047
Cu	0.750	-0.661	0.982	-0.164	-0.091
Pb	0.765	-0.644	0.560	-0.811	0.019
As	0.992	-0.128	0.982	-0.052	-0.130
Mo	0.804	-0.595	0.980	-0.108	-0.145
Ni	0.802	-0.598	0.992	-0.087	-0.051
Ag	0.572	-0.820	0.946	-0.223	-0.034
Th	0.781	-0.624	0.992	-0.058	-0.108
V	0.773	-0.635	0.986	-0.128	-0.101
Zn	0.800	-0.599	0.584	-0.441	0.396
Se	0.433	-0.902	0.974	-0.112	-0.108

The interplay between these two factors describing ash constituents is shown in Figure 2. Most of the ash constituents consistently showed up in the fourth quadrant of the plot (determined by dotted lines) suggesting similar interdependencies in the materials. Note that TOC is positioned nearly opposite of iron, manganese, and arsenic, suggesting a negative correspondence among these components. In addition, Figure 2 shows the relationship of the case-wise factor scores for the different ash samples. The fact that samples are positioned in different quadrants suggests that the ash composition differs to some extent as ash is transported from the source pile, to the Emory River, and finally to the sluice channel. Figure 3 shows the combined factor analysis for the ash samples to the reference soils and sediments. Compared to the reference materials, the Emory River and sluice channel ash samples factor out similarly, while the source pile ash shows similar compositional interrelationships to reference river sediment, RF2.

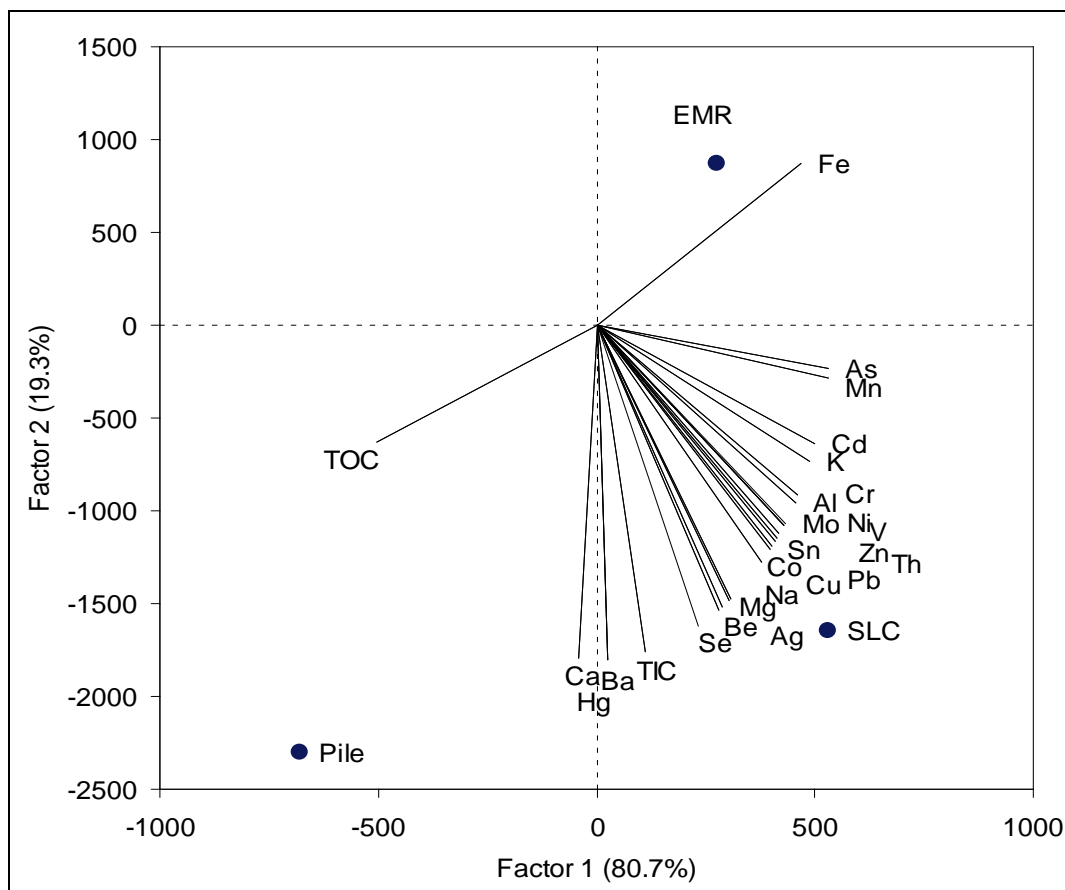


Figure 2. Factor loading plot demonstrating interdependent structure in the two factors from principal factor analysis of the solid-phase constituents from the ash samples collected at the original source pile (Pile), the Emory River (EMR), and the sluice channel (SLC). Data points are case-wise factor scores while solid lines represent the element eigenvectors. Values in parentheses represent the percent variance explained by each factor.

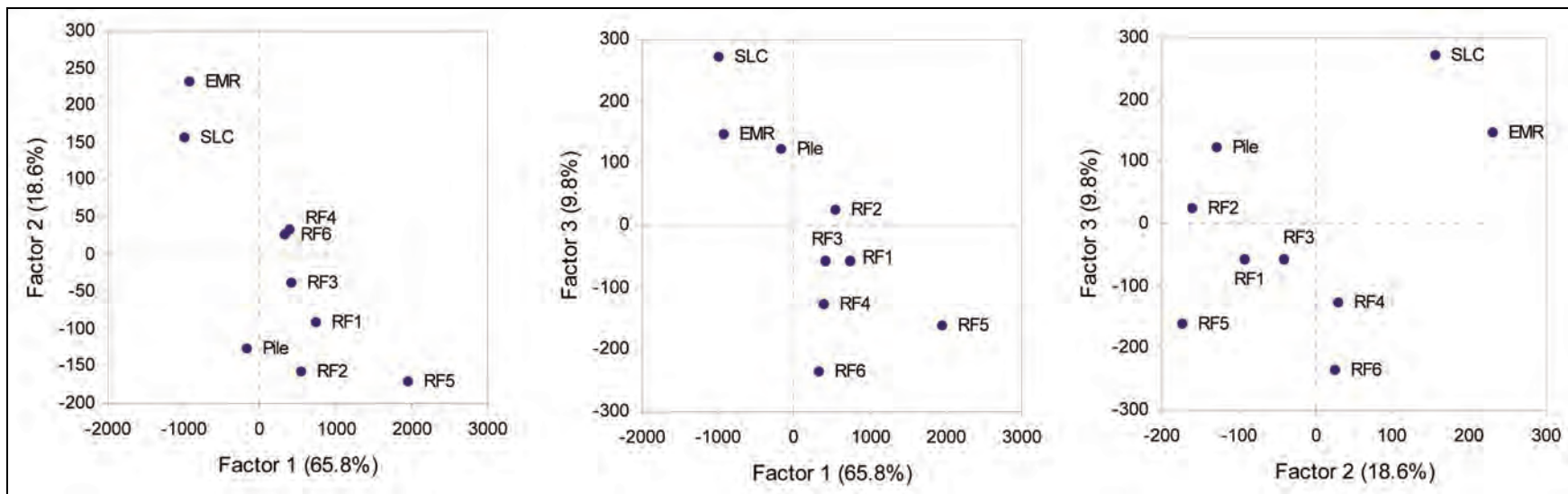


Figure 3. Plots showing the distribution of case-wise factor scores for reference soil and sediment (RF1 - 6) samples relative to the ash samples with respect to factor loading. Details of the plot are described in the caption of Figure 2.

Ash metal speciation: Sequential extraction analysis

The sequential extraction procedure is designed to represent the potential for removing the contaminant with increasingly more “aggressive” solvents (going from the left to the right sides of Tables 8-10). Contaminants removed in the early steps of the sequential extraction suggest the contaminants (soluble and exchangeable phases) are readily dissolved from the surface. Contaminants removed in the later stages represent the more residual phases, or nonextractable phases, and are recalcitrant and difficult to remove from the system.

The concentrations of metals in each of the geochemical phases obtained from the sequential extraction procedure are listed in Tables 8-10 for the three fly ash samples tested. Results of the sequential extraction analysis suggest several elemental associations present in the fly ash materials. Specifically, the extraction simulating metal oxide phase association was enriched in arsenic, suggesting a possible association with iron and manganese oxide phases in the ash. High amounts of arsenic and iron

Table 8. Partitioning of Emory River fly ash metals into six geochemical phases.

Phase	Soluble	Exchangeable	Carbonate	Oxide	Organic/Sulfide	Residual
Metal Concentration (mg/kg)						
Arsenic	2.4	1.8	11.8	32.7	4.8	42.6
Barium	0.3	35.5	68.2	110.5	44.0	204.3
Beryllium	<0.1	<1	0.3	1.0	0.3	2.8
Cobalt	<0.1	<1	0.3	1.8	0.5	9.8
Chromium	<0.1	<1	3.3	11.9	3.1	17.8
Copper	<0.1	<1	6.1	2.1	13.3	31.7
Iron	0.1	1.1	110.0	1086.5	63.3	5457.8
Manganese	<0.1	3.4	19.6	24.9	3.4	34.8
Mercury	<0.008	<0.008	0.016	0.018	<0.008	0.022
Molybdenum	0.2	<1	0.2	1.4	0.5	1.6
Nickel	<0.1	<1	0.7	3.1	1.1	19.9
Lead	<0.1	<1	0.4	1.4	0.6	16.2
Antimony	<0.1	<1	0.3	0.4	0.3	0.1
Selenium	0.4	<1	0.7	1.2	4.0	2.5
Thallium	<0.1	<1	0.2	0.6	0.3	0.6
Vanadium	1.2	<1	4.0	38.1	8.2	41.1
Zinc	0.2	1.7	2.5	7.3	2.6	30.2

Table 9. Partitioning of storage pile fly ash metals into six geochemical phases.

Phase	Soluble	Exchangeable	Carbonate	Oxide	Organic/Sulfide	Residual
Metal Concentration (mg/kg)						
Arsenic	<0.1	<1	4.9	9.4	1.9	33.7
Barium	1.4	67.1	77.2	76.8	14.2	190.2
Beryllium	<0.1	<1	0.4	0.9	0.3	1.5
Cobalt	<0.1	<1	0.3	1.9	0.6	5.4
Chromium	<0.1	<1	3.1	9.0	2.2	11.3
Copper	<0.1	<1	3.8	0.4	14.5	19.0
Iron	<0.1	1.4	165.1	1212.8	152.3	5225.3
Manganese	<0.1	<1	5.7	24.4	3.7	25.9
Mercury	<0.008	<0.008	0.008	0.010	<0.008	0.014
Molybdenum	0.1	<1	<0.2	1.0	<0.2	1.4
Nickel	<0.1	<1	0.7	2.9	1.3	10.7
Lead	<0.1	<1	0.3	0.8	0.2	10.2
Antimony	<0.1	<1	0.2	0.2	<0.2	0.1
Selenium	0.1	<1	0.7	1.4	2.4	2.1
Thallium	<0.1	<1	0.2	0.4	<0.2	0.4
Vanadium	<0.1	<1	2.1	32.9	3.1	29.0
Zinc	0.2	1.9	2.2	5.7	2.7	15.1

Table 10. Partitioning of Sluice Channel fly ash metals into six geochemical phases.

Phase	Soluble	Exchangeable	Carbonate	Oxide	Organic/Sulfide	Residual
Metal Concentration (mg/kg)						
Arsenic	2.2	1.2	11.7	38.9	3.2	41.5
Barium	0.3	24.8	50.4	79.9	19.3	140.9
Beryllium	<0.1	<1	0.2	0.7	0.3	1.9
Cobalt	<0.1	<1	0.4	1.7	0.7	7.1
Chromium	<0.1	<1	2.5	11.1	2.7	15.5
Copper	<0.1	<1	6.7	1.1	13.3	23.5
Iron	0.4	1.5	111.3	1107.6	134.1	5374.3
Manganese	<0.1	3.8	23.6	37.4	4.7	31.4
Mercury	<0.008	<0.008	<0.008	<0.008	<0.008	0.016
Molybdenum	0.2	<1	<0.2	1.1	<0.2	1.7
Nickel	<0.1	<1	0.6	3.1	1.5	15.3
Lead	<0.1	<1	0.4	1.6	0.5	12.5
Antimony	<0.1	<1	<0.2	0.3	<0.2	<0.1
Selenium	0.4	<1	0.4	1.3	3.4	1.9
Thallium	<0.1	<1	<0.2	0.5	0.3	0.5
Vanadium	1.1	<1	3.9	31.4	3.5	36.7
Zinc	0.1	2.0	3.1	6.7	3.0	23.9

were also observed in the residual phase, suggesting limited aqueous mobility. Although much lower in total concentration, selenium association with the oxide and residual phases is also noted. In general, a relatively large amount of the metals observed in the fly ash materials are present in the residual phase. Therefore, it would be expected that these metals would not easily become mobile in normal aqueous environments. There are, however, measureable (<1 mg/kg) amounts of several elements, including arsenic, selenium, barium, zinc, and vanadium, that are in the soluble and exchangeable phases, and therefore represent potentially mobile compounds.

Iron and manganese were primarily present in the residual phase, suggesting that somewhat crystalline oxide phases are present, although approximately 20% of the iron measured was in the reducible oxide phase, suggesting at least some amorphous oxyhydroxides were present. The oxyhydroxides are well known to sorb other elements, and therefore explain the association of arsenic, selenium, chromium, and vanadium. Furthermore, significant amounts of iron and manganese are observed in the carbonate phase, indicating precipitation of carbonates may also have occurred. Also, the sulfide and organic matter phase is notably elevated in copper, which would be expected to precipitate as an insoluble sulfide. The presence of arsenic in this phase would also suggest that realgar or orpiment type phases may be present as well. However, of particular interest is the presence of selenium in the organic matter-sulfide phase.

Ash elemental speciation: X-ray absorption spectroscopy analysis

Bulk carbon and nitrogen speciation. Carbon-edge NEXAFS data shows a peak at ~ 290 eV for the ash collected from the source pile (Figure 4) representing C(1s) $\rightarrow \pi^*$ transition for C=O carbonyl C, a ~285 eV for aromatic C, and a secondary oxygen peak at ~271 eV. The ash pulled from the Emory River shows an additional peak at ~287 eV, possibly representing phenolic C, while the secondary oxygen peak is barely visible. The carbon groups observed from the ash in the sluice channel are similar to the source pile. Nitrogen-edge NEXAFS (Figure 5) demonstrates a low N content in the source pile – with very limited information observable for source pile nitrogen functional groups. Ash pulled from the Emory River and sluice channel, however, showed evidence of nitrated and amino groups. The data suggest that the ash accumulated natural organic matter while residing in the Emory River. It should be noted that TOC levels in the source pile are higher than those measured for the Emory River and

sluice channel samples (Table 5). This may be a result of the fact that the source pile samples were collected at the top of the remaining ash pile, which was sprayed with a polysaccharide-based binder material to stabilize the particles. Thus, source pile N was barely detectable, but clearly visible in the Emory River and sluice channel samples. N and C profiles were observed to be somewhat different in the sluice channel samples, probably due to losses of humic material from the turbulent dredging process. However, the data suggest that the ash does remain permanently modified by its residence in the river.

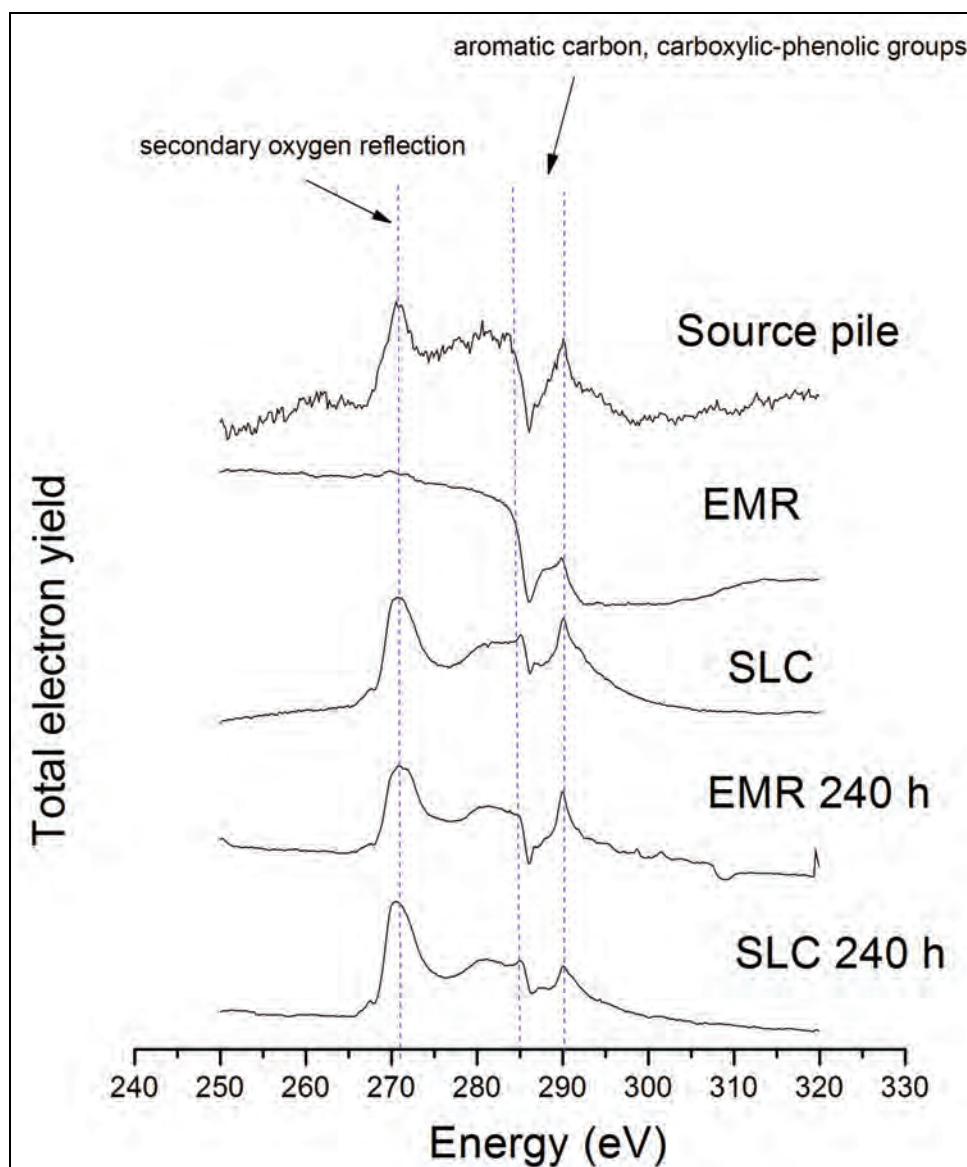


Figure 4. Carbon NEXAFS spectra for ash collected from the source pile, the Emory River, and sluice channel sediments and elutriates.

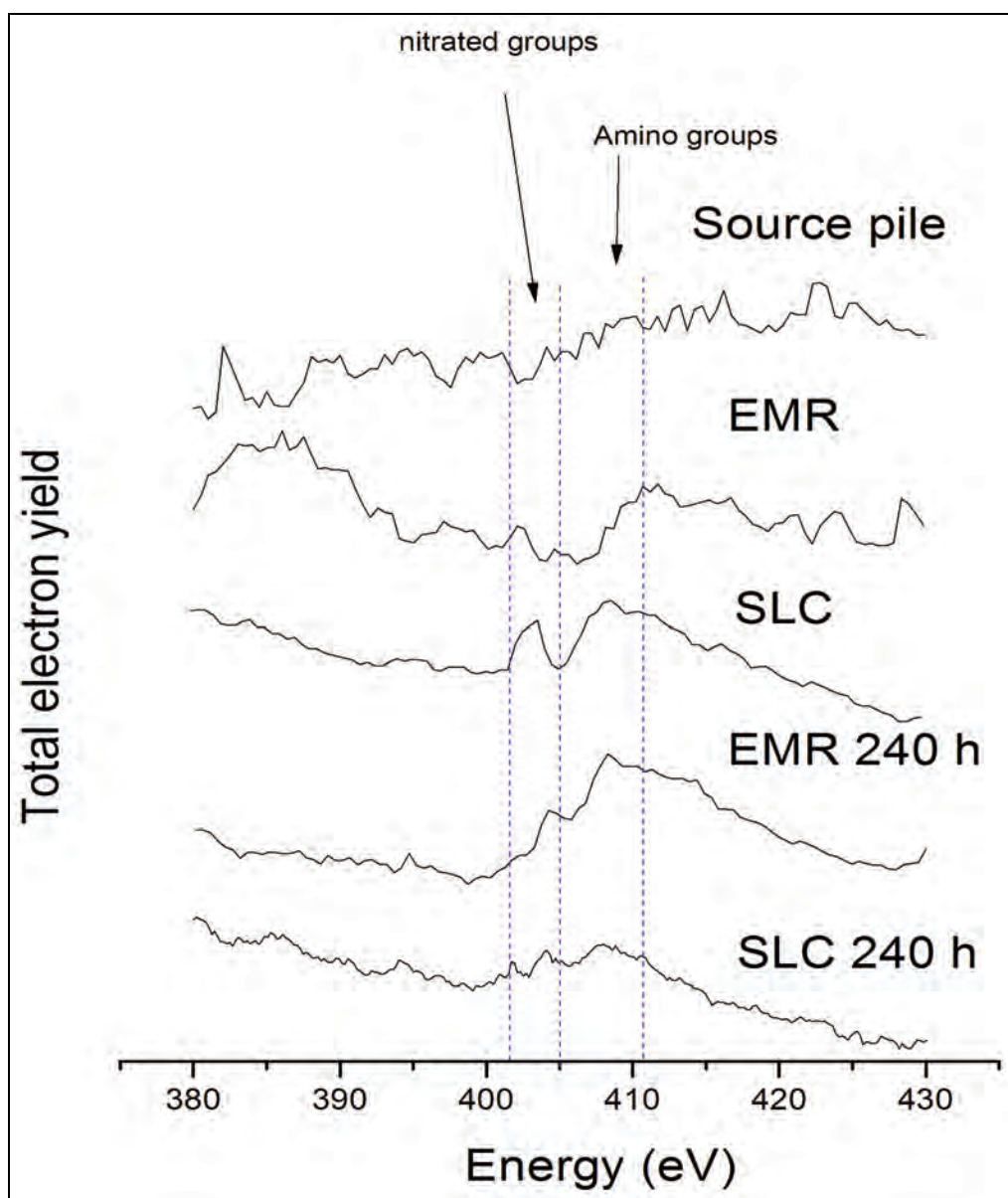


Figure 5. Nitrogen NEXAFS spectra for ash collected from the source pile, the Emory River, and sluice channel sediments and elutriates. "240 h" denotes the 10-day elutriate preparation period.

Bulk manganese speciation. Bulk Mn XANES data are of relatively poor quality and required considerable smoothing of the data. However, the data (Figure 6) showed the source pile ash contained oxidized Mn (e.g., Mn(IV)) with a minor proportion of reduced Mn (e.g., Mn(II)). Once deposited into the river, the Mn in the ash appears to reduce to predominantly Mn(II). Ash collected in the sluice channel shows similarly reduced Mn, suggesting dredging activities did not affect the net redox of the ash. The XANES data for Mn were not sufficiently detailed to estimate the Mn compounds contained within the ash.

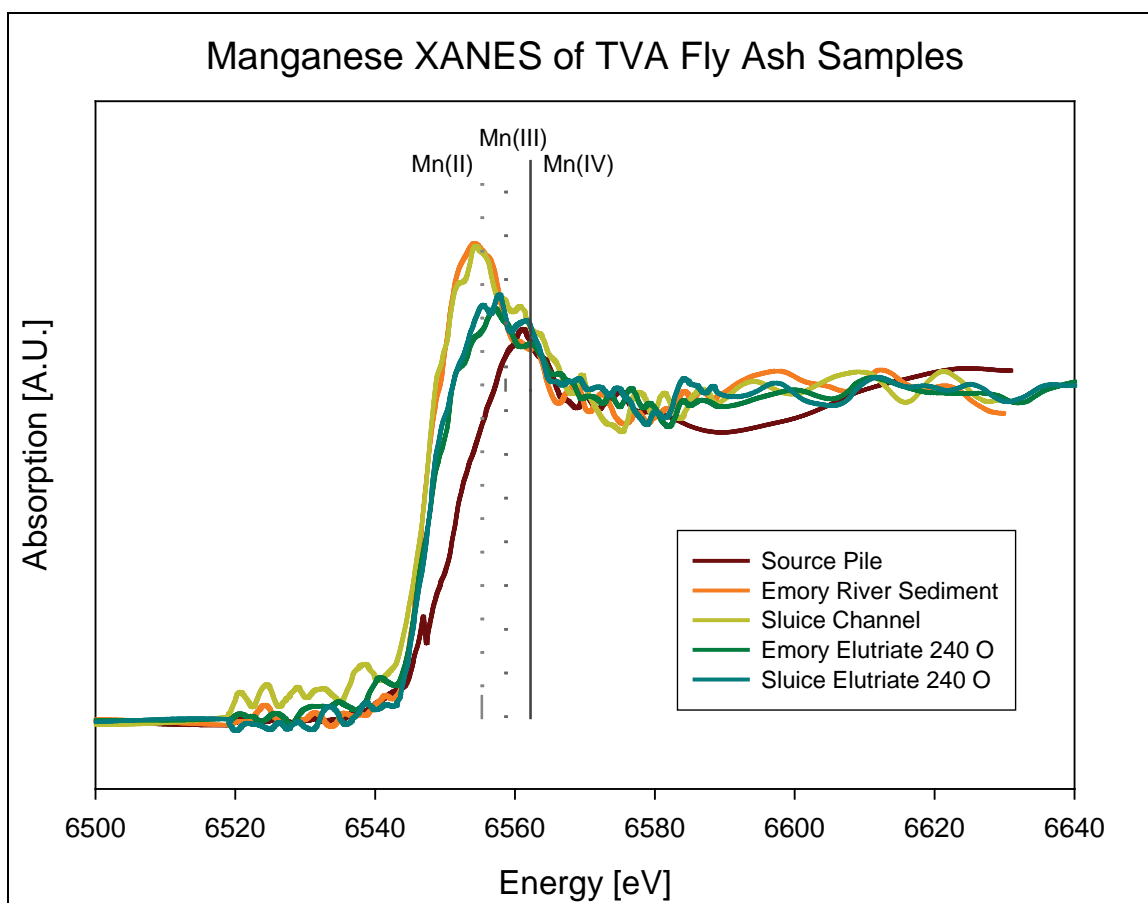


Figure 6. XANES data collected at the manganese K-edge energy for bulk ash and elutriate samples, where O means oxic regime elutriate samples. "240 h" denotes the 10-day elutriate preparation period.

Bulk iron speciation. LCF analysis of Fe K-edge XANES (Figure 7) showed the ash contained approximately 70 % oxidized Fe(III) and 30 % reduced Fe(II) (Table 11). No change was observed in the proportion of Fe(II) to Fe(III) with residence of the ash in the river or following dredging activities. This means that the Fe phases in the source pile ash did not reduce to secondary Fe-oxide minerals, but remained stable while residing in the river. LCF results suggest that the Fe forms are a mixture of ferrihydrite and maghemite minerals.

Bulk chromium speciation. Bulk chromium speciation was difficult due to the low concentrations and limitations of the experimental setup. XANES analysis (data not shown) suggests the ash contains predominantly Cr(III), with the possibility of trace levels of Cr(VI), yet the data are insufficiently clear to verify this distinction.

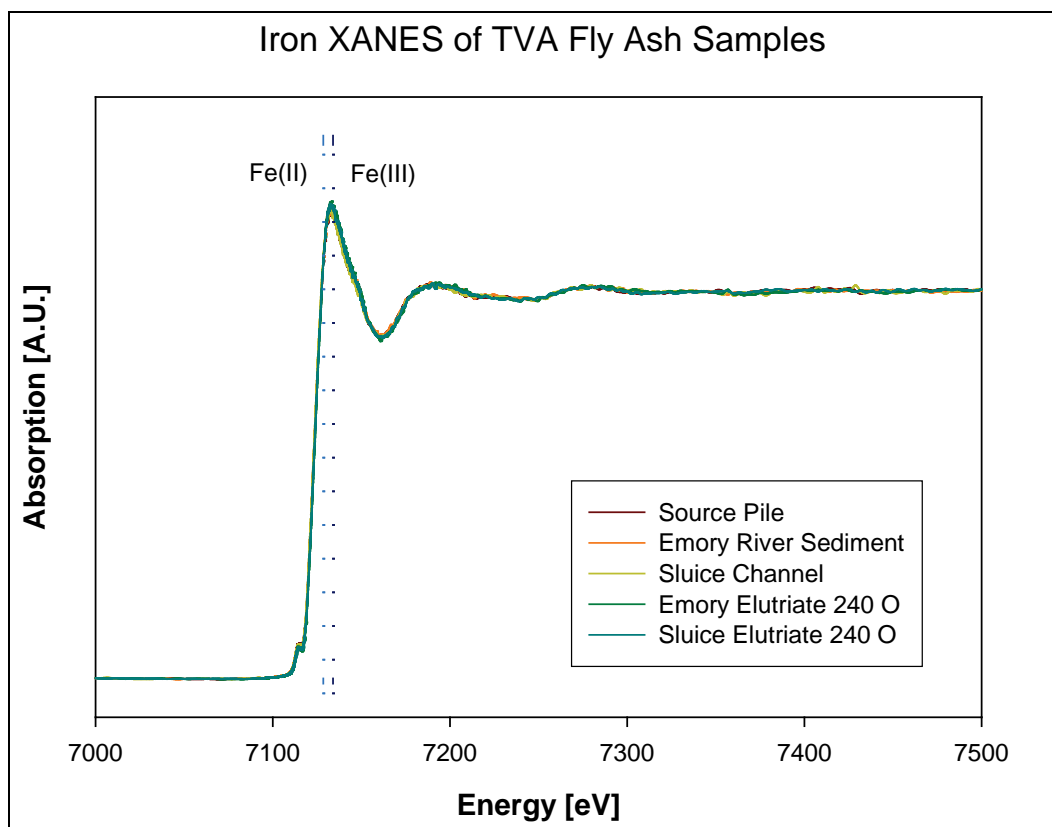


Figure 7. XANES data collected at the iron K-edge for bulk ash and elutriate samples where “O” denotes elutriates treated with oxid regime. “240 h” denotes the 10-day elutriate preparation period.

Table 11. Linear combination results for Fe XANES data on bulk ash and elutriate samples.

Samples	Fe(II) %	Fe(III) %
Ash Samples		
Source Pile	30.0	70.0
Emory River Sediments	28.3	71.7
Sluice Channel	30.7	69.3
Elutriates		
Emory EL 240 h (air)	21.0	79.0
Sluice EL 240 h (air)	23.3	76.7

Bulk arsenic speciation. XANES data (Figure 8) show arsenic existed primarily as As(V) in the source pile, with trace proportions of As(III) and sulfide-bound arsenic (Figure 9). The bulk analysis shows little change in arsenic speciation in the ash collected from the Emory River and the sluice channel from the source pile.

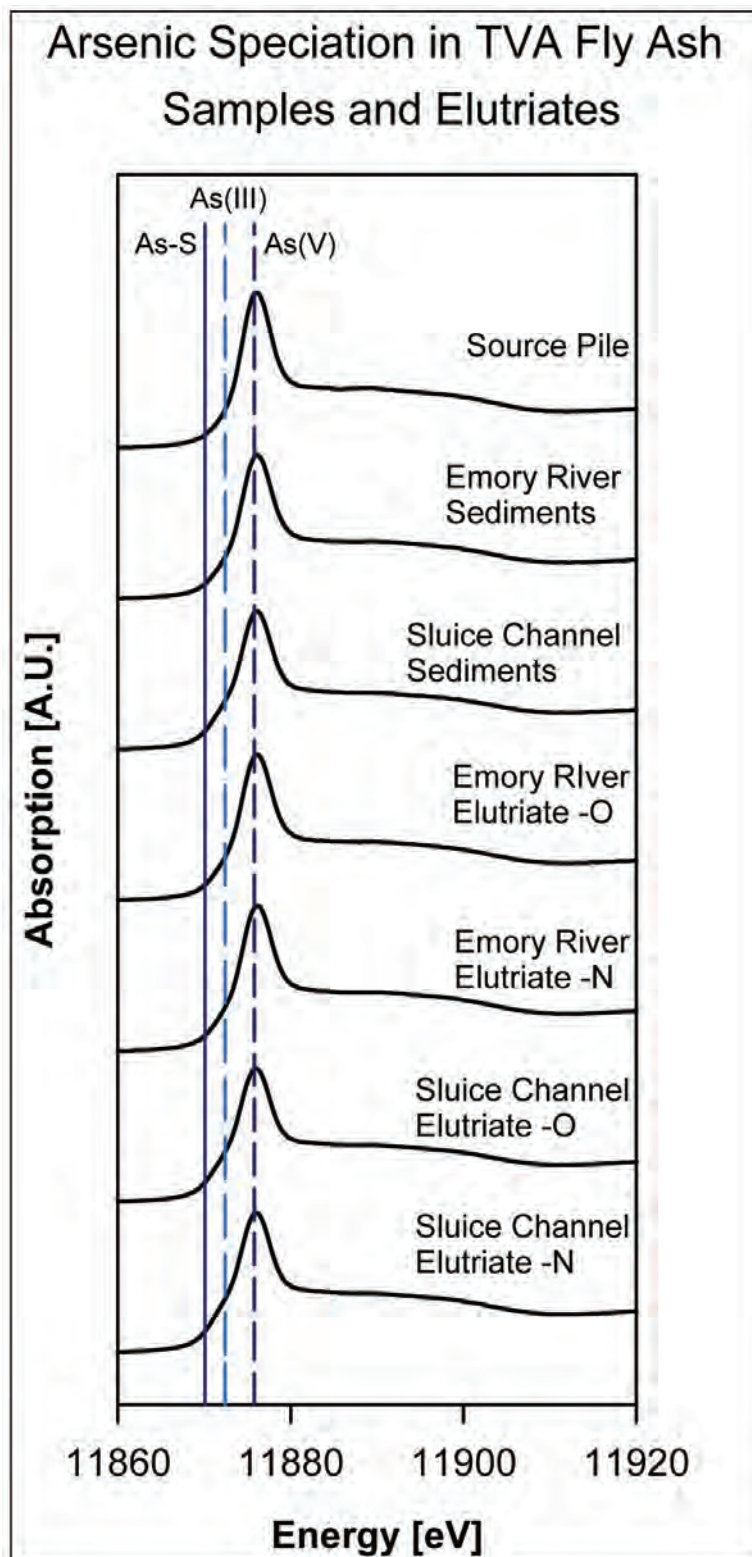


Figure 8. XANES spectra collected at the arsenic K-edge for bulk ash and elutriate samples.

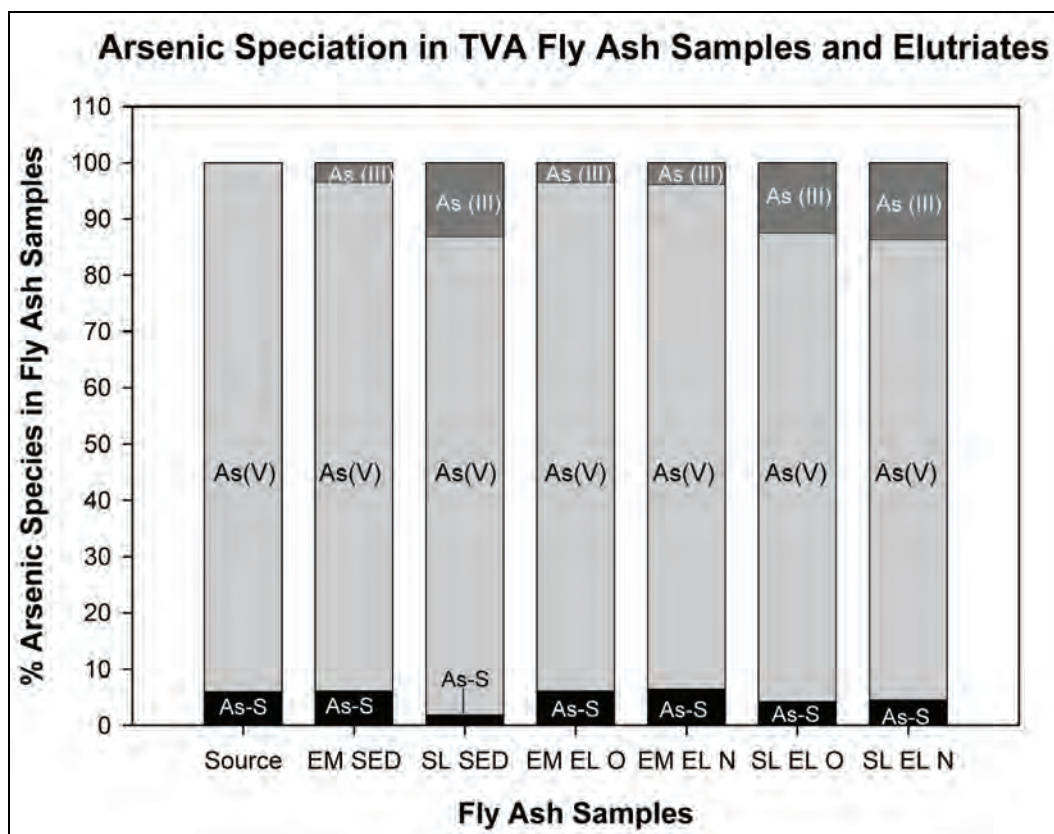


Figure 9. Linear combination results for arsenic XANES data (Figure 8) on bulk ash and elutriate samples, where: EM = Emory River, SL = Sluice Channel, SED = sediment, and EL = elutriate samples. The "O" and "N" represent whether the elutriates were bubbled with air (oxic regime) or nitrogen (anoxic regime), respectively.

Bulk selenium speciation. Selenium K-edge XANES (Figures 10-12) analysis shows a notable change in form of selenium after the ash was introduced into the river. The analysis shows that the selenium form changed from predominantly selenite in the source pile to a mixture of species in the Emory River and sluice channel sediments. Linear combination fittings for the Emory River and sluice channel sediments estimated that 30 to 50% of the Se exhibited relatively low absorption edge energies. A number of more reduced selenium species have absorption edge energies in this range including: elemental Se, selenium sulfide (SeS_2), and selenium bound to thiol bearing C-compounds (e.g. cysteines and methionines), see Figure 11. Closer investigation of these samples suggests that a portion of these reduced selenium species may be composed of selenium species covalently bound to thiol and organic carbon-bearing materials, as the Se(II) species. As demonstrated in the NEXAFS data, natural humic materials, either dissolved or suspended in the Emory River water, accumulated on the surface of the ash particles after the spill. Once introduced to natural humic material, the data show that selenium

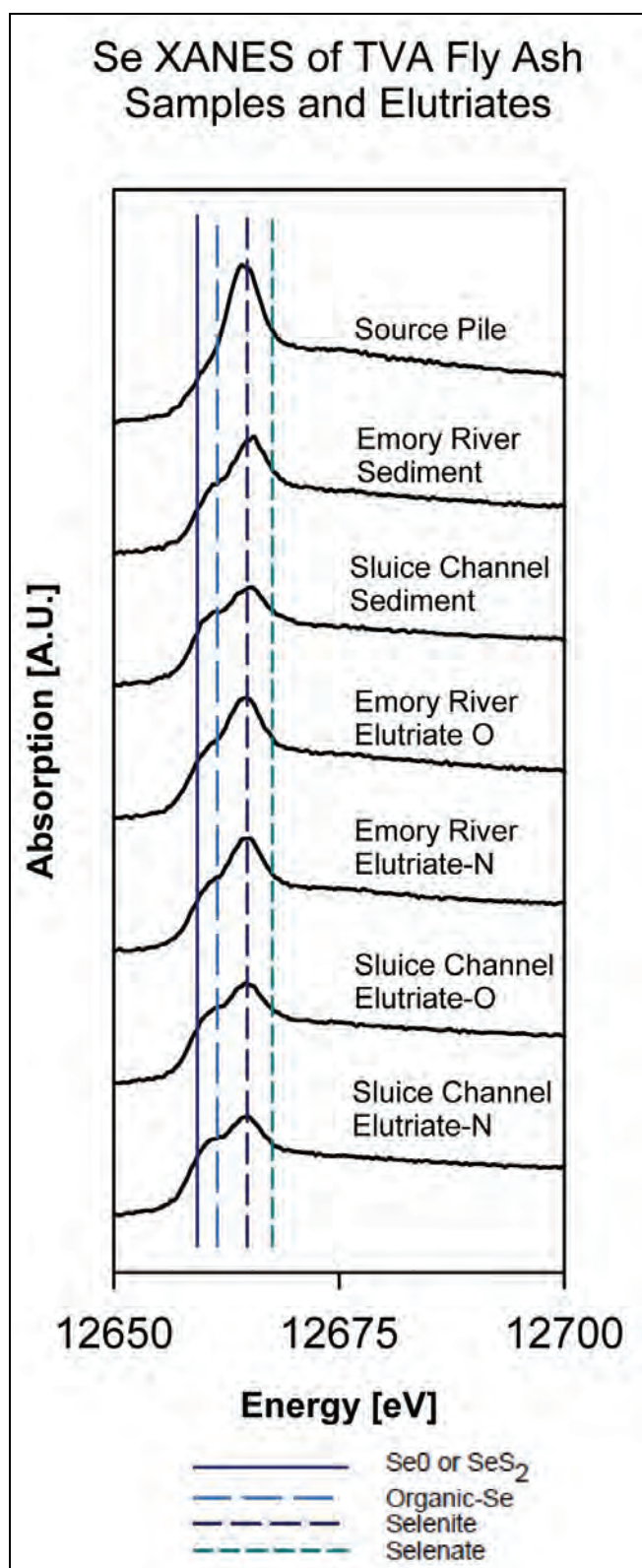


Figure 10. XANES spectra collected at the selenium K-edge for bulk ash and elutriate samples. Elutriate data are discussed in the next chapter.

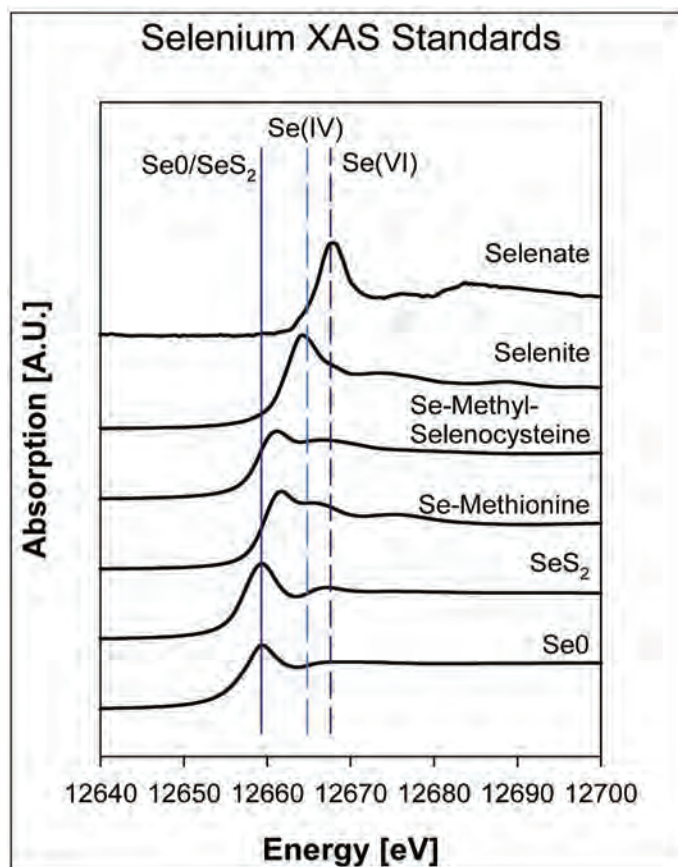


Figure 11. XANES spectra collected at the selenium K-edge for use as reference samples, including the selenium-bound thiol compounds: Se-methyl-selenocysteine and Se-methionine.

somehow reacted to form what appears to be covalently bound complexes with the organic carbon and thiol-rich material – commonly referred to as organoselenium. This conclusion is consistent with the scientific literature (Chaissaigne et al. 2004, Haratake et al. 2009, Tarze et al. 2007), showing that selenium forms very strong, covalent-nature complexes with organic thiol groups, and in the process is reduced to Se(II). For example, Huggins et al. (2007) used XANES to determine Se speciation in fly ash and found an organoselenium component. A few studies dispute the direct association of organoselenium with natural humics, citing incompatibilities with sequential extraction experiments and competitive sorption processes (Kamei-Ishikawa et al. 2007, Ponce de Leon et al. 2003, Séby et al. 1997) while others claim organoselenium can be extracted with soil fulvic acids (Rael and Frankenberger 1995) under alkaline extracting conditions. Further investigations are justified in elucidating the nature of the Se-humic complex, as this represents the dominant form of selenium in the spilled ash materials.

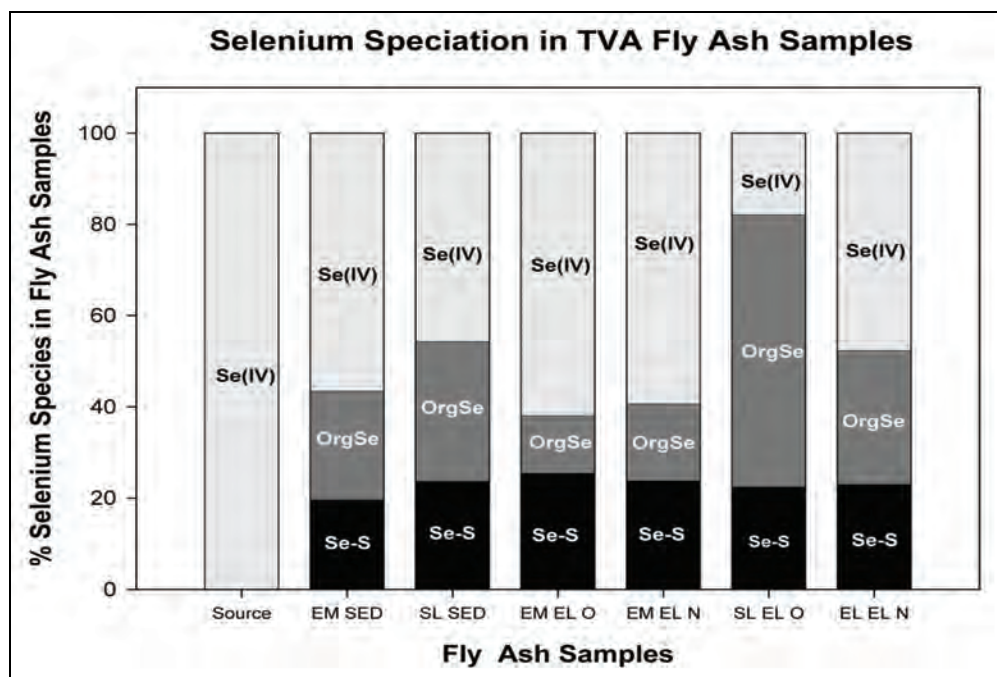


Figure 12. Linear combination results for selenium XANES data (Figure 10) on bulk ash and elutriate samples.

Micro-metal distribution and speciation. Realizing the large degree of heterogeneity that exists in natural systems, micro-mapping analysis was performed to assess the accuracy of the bulk representations of ash metal species on a microscopic scale. Using the μ -XRF technique (Figure 13), analysis found that metals were non-uniformly distributed, exhibiting μ m-range heterogeneity throughout the fly ash material collected from the original source pile and the Emory River. In some cases, the data showed overlapping domains of selenium, manganese, iron, chromium, calcium, mercury, and arsenic (and sulfur), such as the large particle visible in Figure 13 near the upper right-hand corner of the maps. The occurrence of the metals in this particular arrangement is important as overlapping elemental domains typically represent sites where metals are loaded by a similar chemical mechanism, such as sorption/accumulation on Fe-oxide phases. Such accumulations are commonly observed in natural systems, e.g., soils, sediments. A map for the Emory River fly ash (Figure 14) showed similarly distributed selenium “hotspots” as observed in the source pile (small white spots in the figure). In general, arsenic, selenium, and chromium seem to track the distribution of iron domains as well. According to the μ -XANES analysis (Figure 15), the source pile arsenic is predominantly composed of As(V) with a minor proportion of As(III). The Emory River and sluice channel ash only showed evidence of As(V), with little As(III) detected.

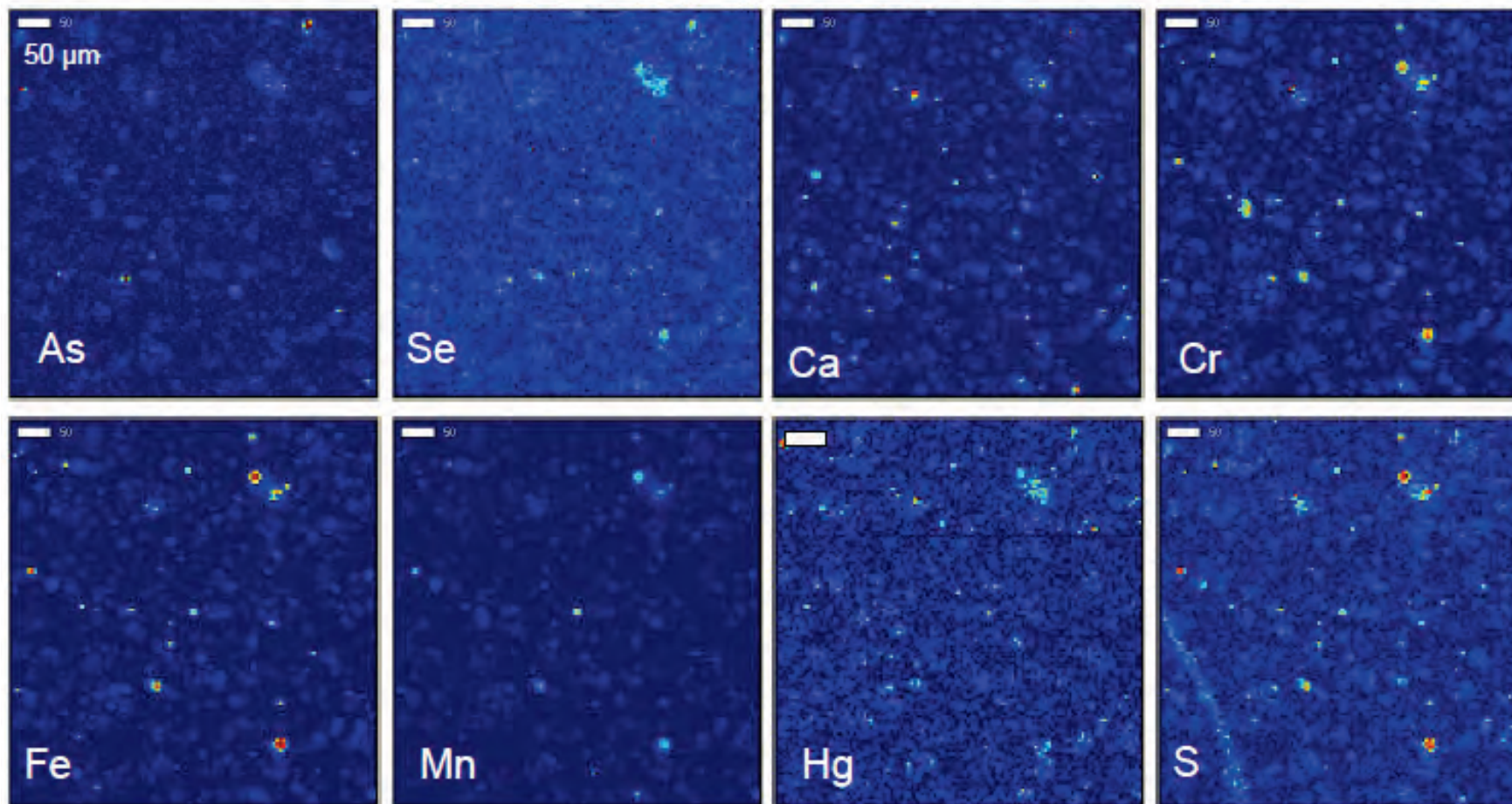


Figure 13. Synchrotron X-ray fluorescence maps depicting elemental distribution in source pile fly ash. Maps were collected at 13000 eV. Areas of warmer colors (white, yellows, and reds) indicate areas of higher concentration, whereas cooler colors like blues indicate areas of lower concentration. Solid white bar represents a 50-µm scale.

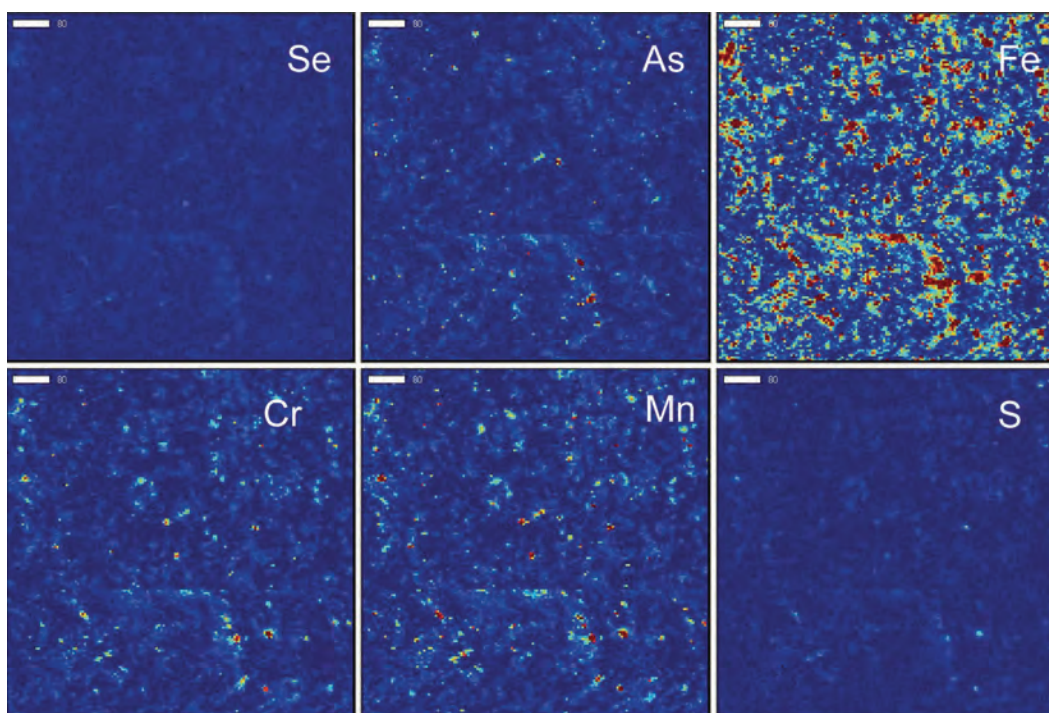


Figure 14. Synchrotron X-ray fluorescence maps depicting elemental distribution in fly ash collected from the Emory River. Maps were collected at 13000 eV. Areas of warmer colors (white, yellows, and reds) indicate areas of higher concentration, whereas cooler colors like blues indicate areas of lower concentration. Solid white bar represents a 80- μ m scale.

Differential μ -XRF mapping was performed to determine the distribution of the selenium species present in the fly ash (Figure 17). The maps were collected by scanning the sample at the energies associated with the different species of selenium, e.g., Se(0, IV, VI). (Figure 18). The maps show significant domains where selenium was detected at the “lower” energies for Se, suggesting either “reduced” (elemental selenium or selenium sulfide, SeS_2) or covalently bound Se(IV) forms (Figure 19). Se(IV) was also evident in the maps, but is much less abundant than “reduced” Se, while Se(VI) was not detected at all in the source pile material.

Further evidence for selenium speciation was obtained by focusing the X-ray beam on particular spots on the source pile sample, and then conducting μ -XANES. Figures 18 and 19 show that spot 1 is largely composed of selenite, while spot 2 contains predominantly “reduced” selenium (probably organoselenium) in the source pile. Similar species of selenium were found in μ -XANES analysis of the Emory River and sluice channel ash samples, typically as mixtures of “reduced” or covalently bound selenium and selenite (Figures 20 and 21). No evidence of localized selenate domains was found in the source pile or the Emory River and sluice channel sediments.

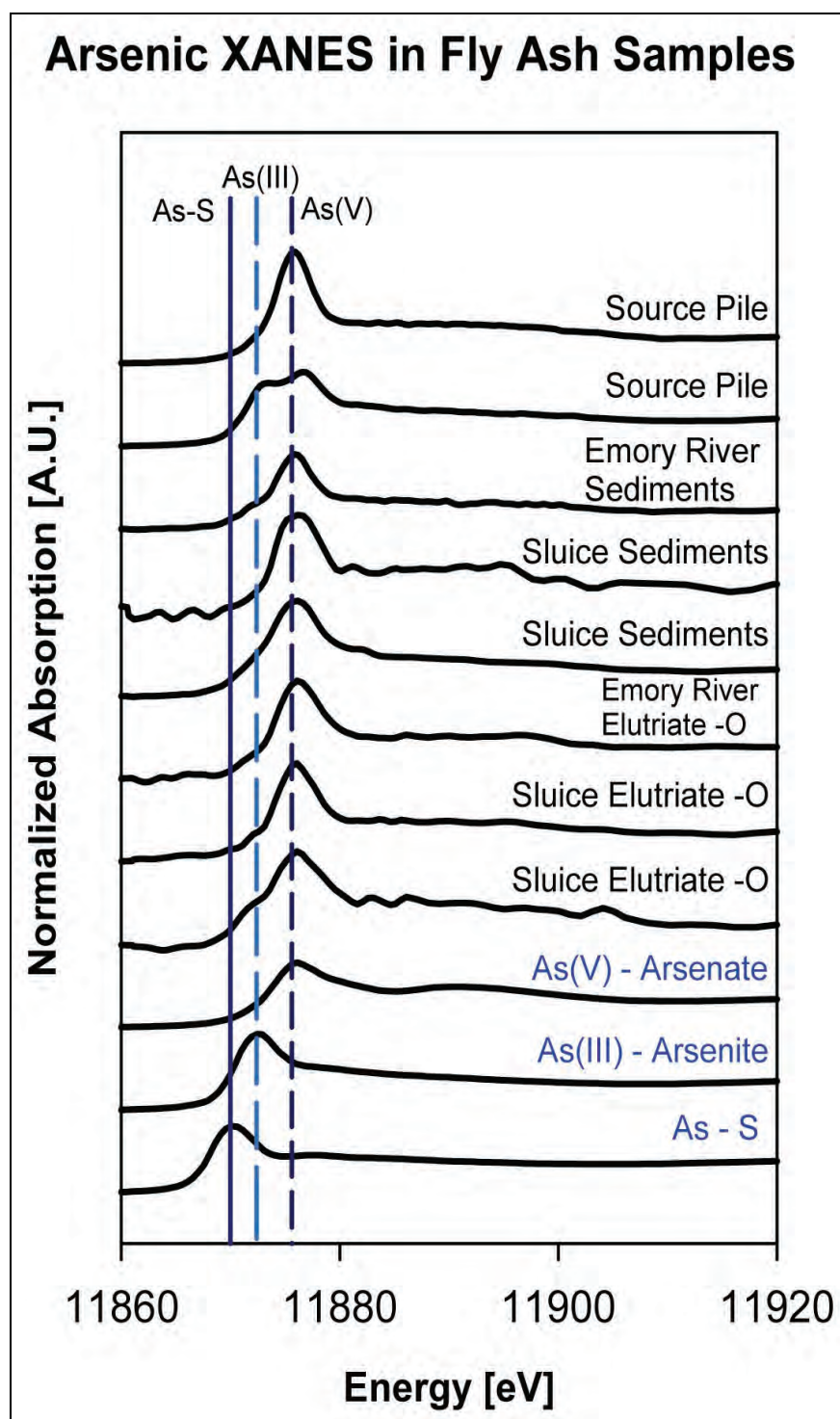


Figure 15. Spot μ -XANES analysis for determining localized arsenic speciation in fly ash and elutriate samples. μ -XANES spectra for arsenate, arsenite, and arsenic bound to S are included for reference.

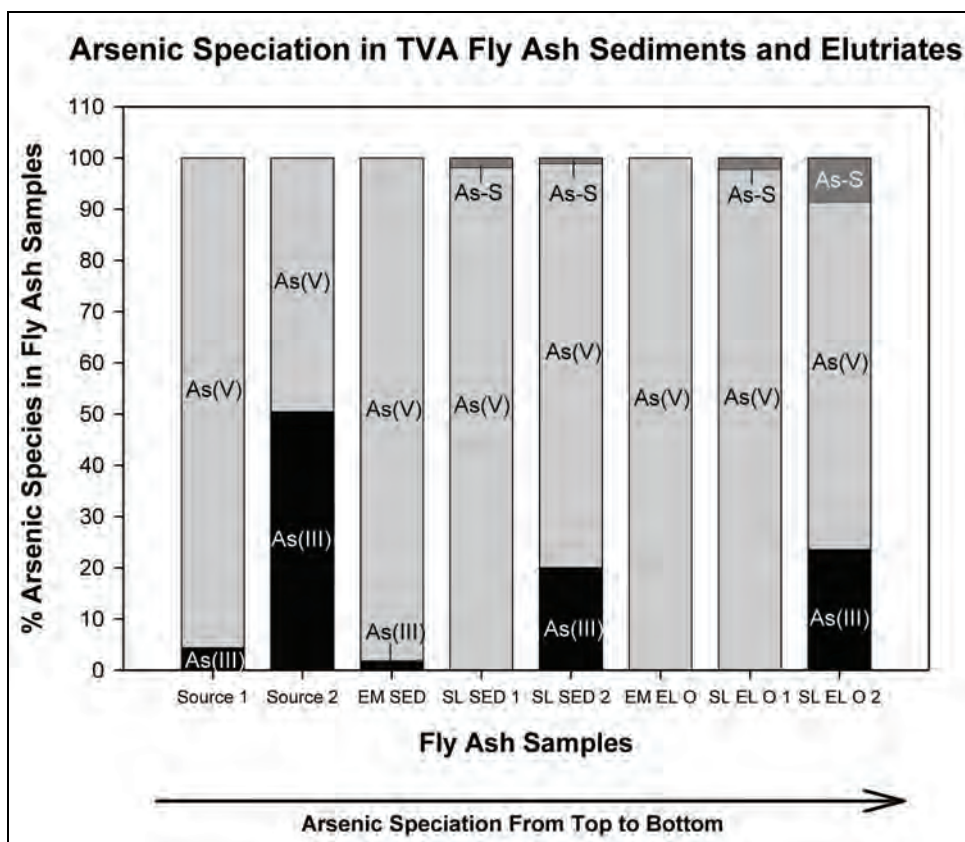


Figure 16. Linear combination results of spot μ -XANES data (Figure 15) for localized arsenic speciation of ash and elutriate samples.

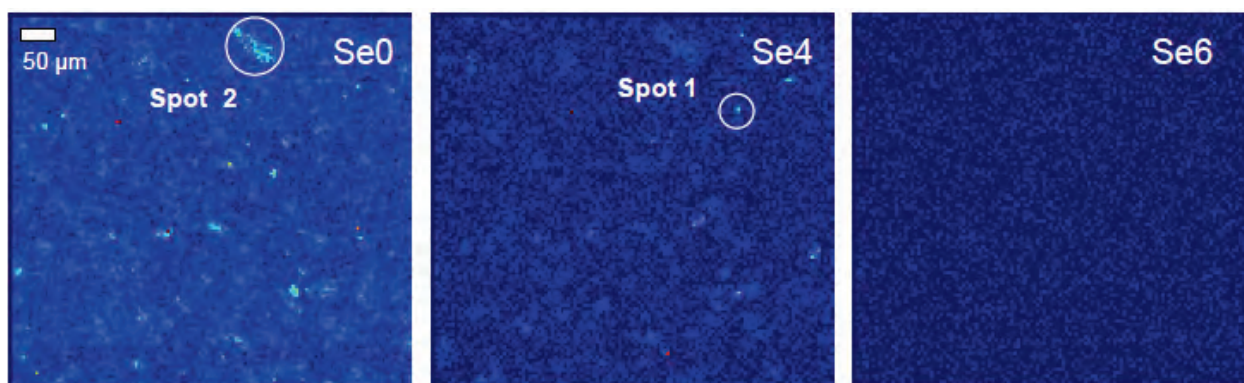


Figure 17. Localized selenium speciation determined by differential energy μ -XRF mapping. This technique allows for selenium speciation of selected areas in the elemental maps. The particular area mapped in the source pile sample shows selenium existing as predominantly “reduced” forms – indicative of either elemental or covalently bound selenium, such as on organic thiol-bearing compounds.

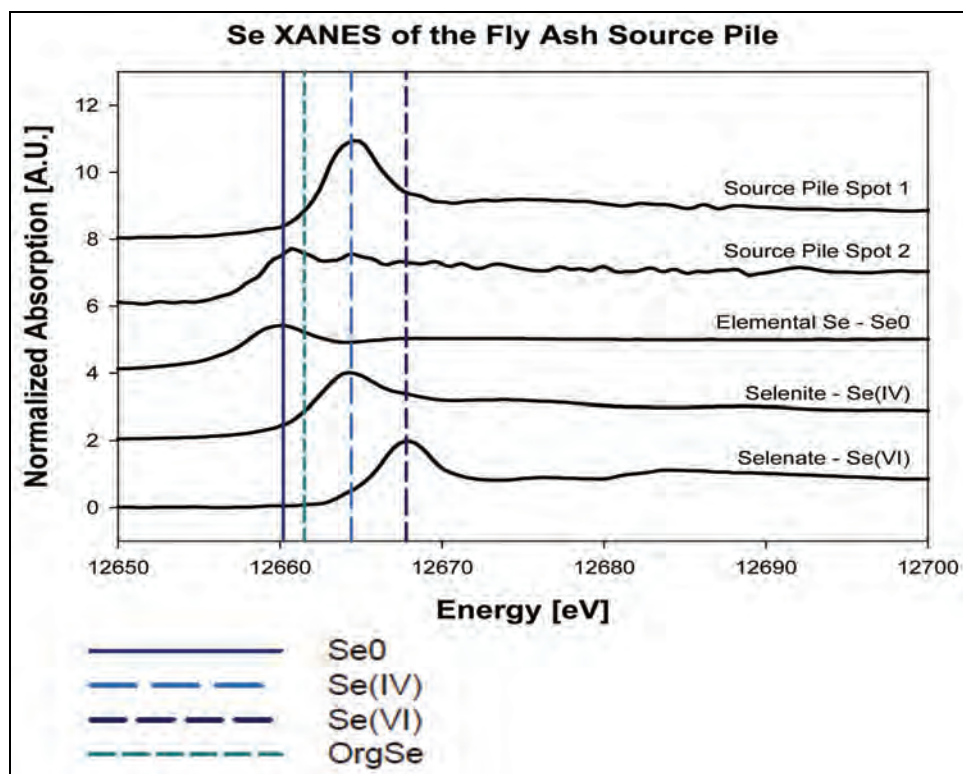


Figure 18. Selenium speciation of the spots defined in Figure 17 for the original source pile fly ash material using μ -XANES. Spectra for Se(0, IV, and VI) are shown for comparison.

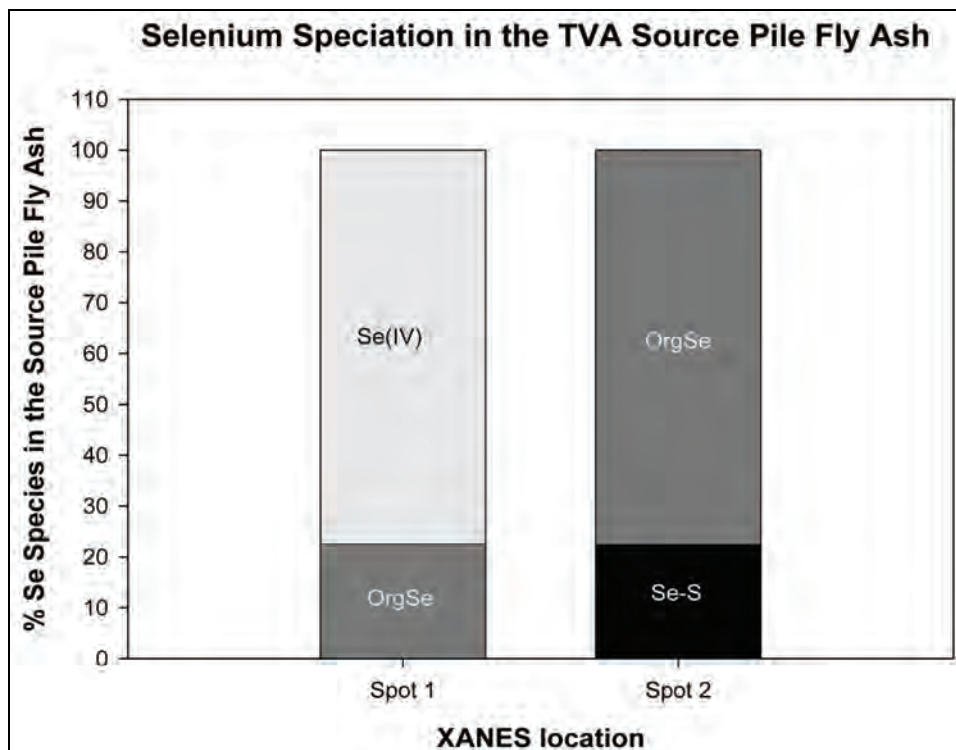


Figure 19. Linear combination results of selenium μ -XANES (Figure 18) data from spots defined on the XRF maps (Figure 17).

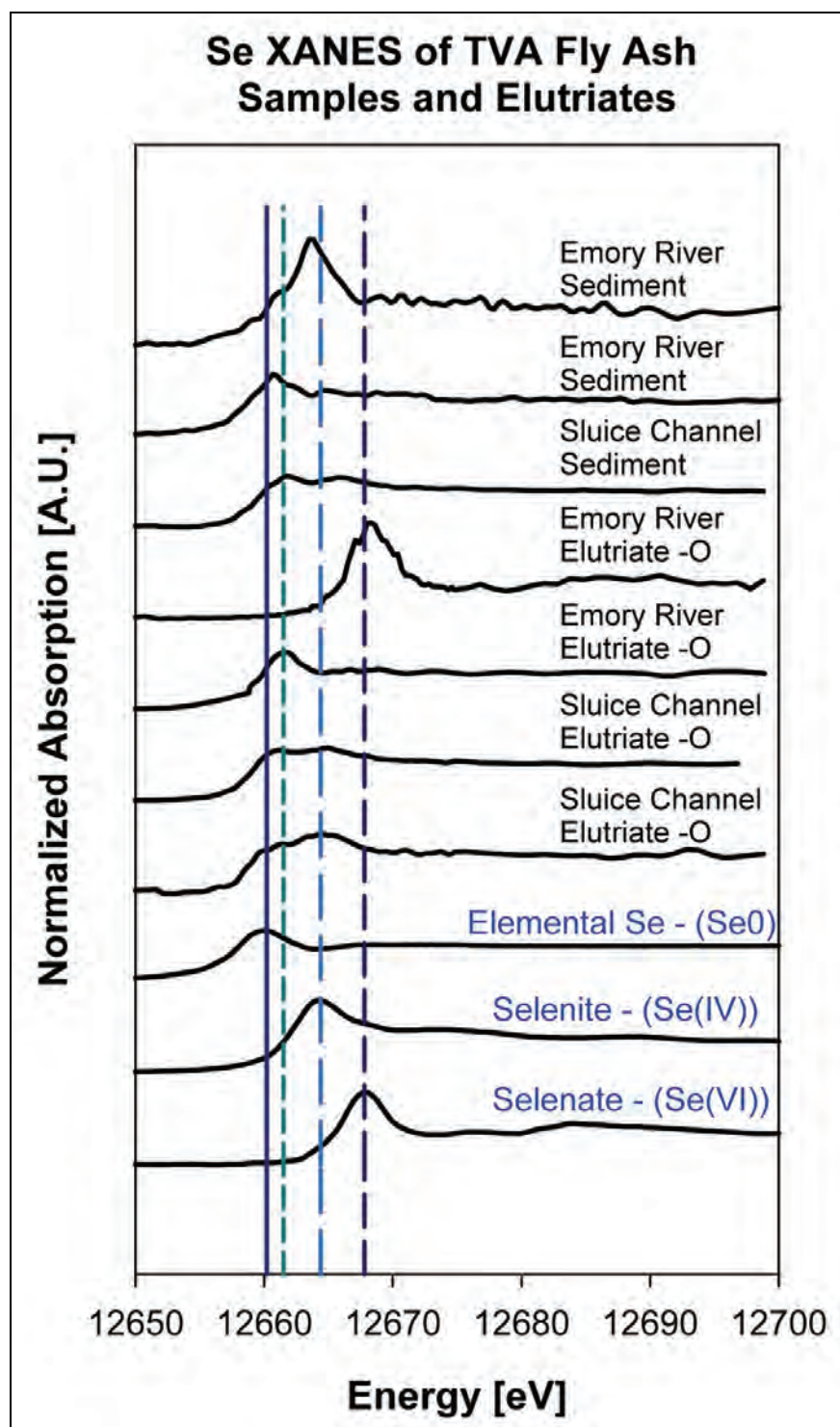


Figure 20. μ -XANES analysis of selenium in the fly ash collected from the Emory River and the sluice channel sediments and elutriates. μ -XANES spectra for Se(0), Se(IV), and Se(VI) are included for reference. Elutriate data are discussed in the next section.

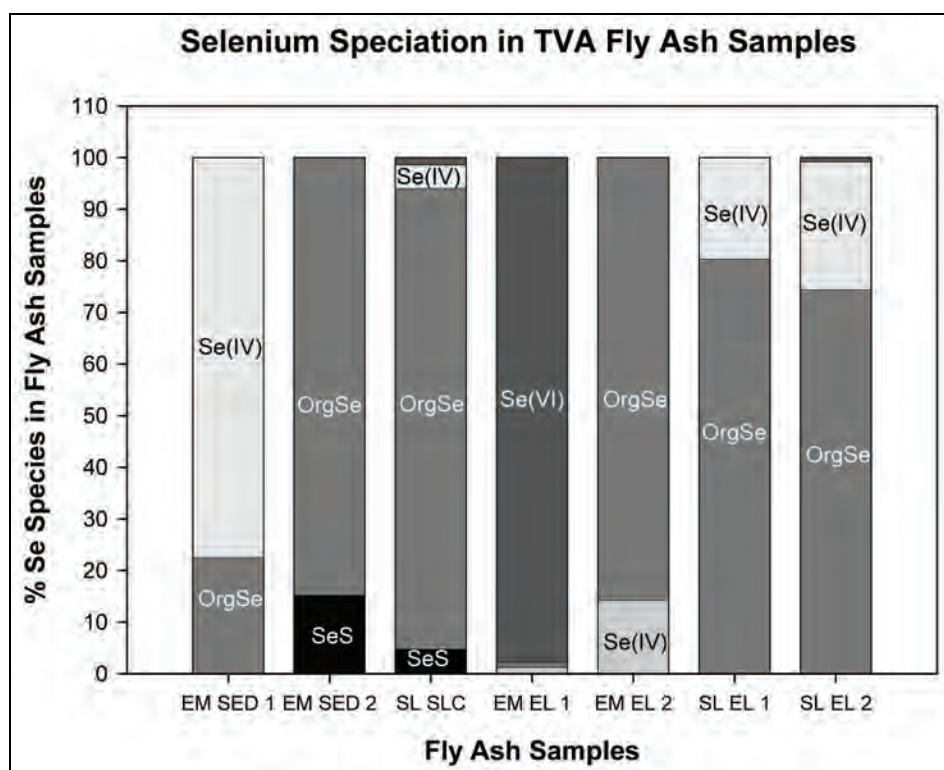


Figure 21. Linear combination results for selenium μ -XANES data for spots on the XRF maps. Elutriate data are discussed in the next section.

Particle size analysis

Particle size distributions (Figure 22) of the fly ash collected from the source pile, the Emory River, and the sluice channel were determined as predominantly composed of silty-sized material (USCS Classification Silt (Silt(ML, Gray)). Specific gravity of the particles was determined as 2.37, 2.41, and 2.35 for the Emory River, sluice channel, and pile samples, respectively. As expected, deposition and dredging activity had little effect on the particle size distribution of the ash.

Site waters

Three site water samples (Emory River, sluice channel, and stilling ponds) were collected from the field and analyzed for dissolved metals (Table 12) and concentrations of dissolved arsenic and selenium species (Table 13). Combined, these data represent the influence of the ash materials on the equilibrium concentration of dissolved metals. In addition, a sample was collected from the stilling pond outflow, prior to release of the dredged waters back to the Emory River after the removal of solids.

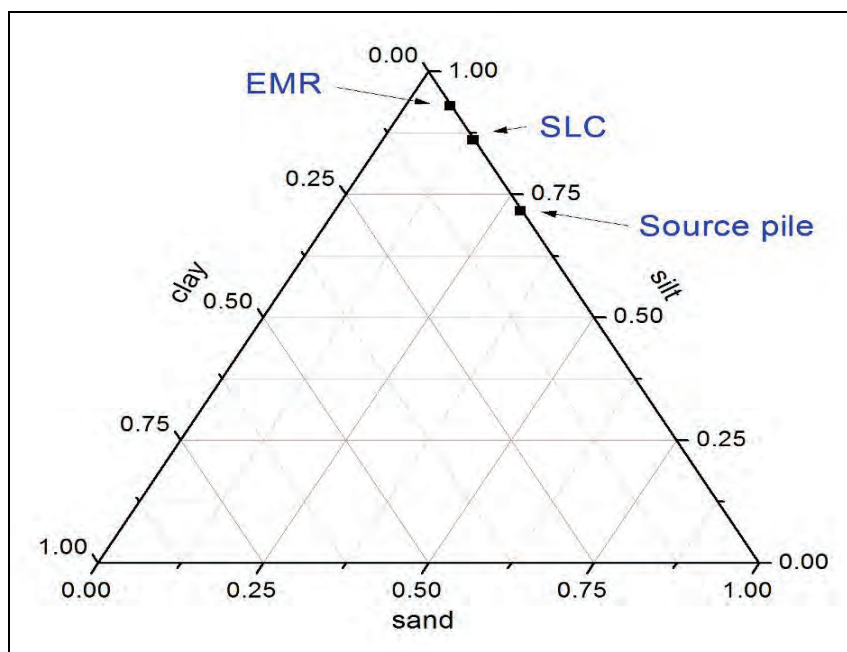


Figure 22. Textural triangle showing the percentages of sand-, silt-, and clay-sized particle in the ash materials collected from the source pile, Emory River, and the sluice channel.

The results of the field water analysis indicate that the dredging operation increases the concentration of the major elements (calcium, magnesium, sodium, and potassium) – a result consistent with the increased electroconductivity (EC) measurement shown in Chapter 2. In addition, several trace elements are also elevated above ambient levels, including arsenic, barium, molybdenum, selenium, and vanadium. Arsenic and selenium are of particular interest, as the concentrations in the sluice channel water reach 78 and 6 $\mu\text{g/L}$, respectively, which are close to the values obtained in the elutriate experiments. The concentration of arsenic falls by a factor of 4 in the stilling pond effluent compared to the sluice channel water. The concentration of selenium in the stilling pond effluent is approximately the same as the sluice channel water (5.4 vs 5.9 $\mu\text{g/L}$).

The presence of selenium (VI) in the stilling pond may be a result of photooxidation of selenium, resulting from the residence time of the waters in the settling system, similar to photooxidation previously reported for arsenic (Bednar et al. 2002, 2003). This is potentially an important area of research as the photooxidation of selenium may be related to the presence of dissolved selenite after the ash has settled. There are many different pathways in which selenium may be oxidized, such as photoreduction of suspended iron oxide particles or radicalization of dissolved organic matter by absorbed UV radiation (Voelker et al. 1997).

Table 12. Concentrations of metals (mg L⁻¹) in site waters (one grab sample each).

Analyte	Emory River	Sluice Channel	Stilling Pond Effluent	Emory River	Sluice Channel	Stilling Pond Effluent
	Dissolved Concentration (mg/L)			Total Concentration (mg/L)		
Aluminum	<0.0500	0.252	0.281	0.228	5.58	1.14
Antimony	<0.0002	0.0081	0.0023	0.0088	0.0411	0.0088
Arsenic	0.0008	0.0779	0.0208	0.0011	0.0767	0.0192
Barium	0.0307	0.107	0.175	0.0340	0.167	0.182
Beryllium	<0.0002	<0.0002	<0.0002	<0.0004	0.0009	<0.0004
Cadmium	<0.0002	0.0003	<0.0002	<0.0004	<0.0004	<0.0004
Calcium	8.55	30.7	34.7	8.93	31.0	34.4
Chromium	<0.0002	<0.0002	0.0041	0.00095	0.0063	0.0081
Cobalt	<0.0002	<0.0002	<0.0002	<0.0004	0.0034	0.0012
Copper	0.0005	0.0005	0.0012	0.0040	0.0190	0.0090
Iron	0.0525	<0.0500	<0.0500	0.253	2.00	0.333
Lead	<0.0002	<0.0002	<0.0002	0.0007	0.0065	0.0017
Magnesium	2.1	5.15	7.34	2.17	5.47	7.38
Manganese	0.0005	0.0296	<0.0002	0.0351	0.0482	0.0235
Mercury	<0.000005	<0.000005	0.000014	0.000148	0.000306	0.000431
Molybdenum	<0.0002	0.0733	0.0236	<0.0004	0.0738	0.0236
Nickel	0.0009	0.0005	0.0013	0.0027	0.0115	0.0055
Potassium	1.29	1.88	2.3	1.71	4.09	2.49
Selenium	<0.0002	0.0059	0.0054	<0.0004	0.0046	0.0043
Silver	0.0005	0.0004	0.001	0.0016	0.0010	0.0023
Sodium	2.44	4.05	7.79	3.01	4.79	8.23
Strontium	0.0424	0.544	0.353	0.0429	0.571	0.352
Thallium	<0.0002	0.0005	0.00029	<0.0004	0.0008	<0.0004
Vanadium	<0.0002	0.0509	0.0317	0.0005	0.0769	0.0390
Zinc	0.0057	0.0058	0.0064	0.0210	0.0334	0.0285

Table 13. Concentration (µg/L) of arsenic and selenium species measured in site-collected waters.

Sample	As(III)	As(V)	Se(IV)	Se(VI)
	Concentration (µg/L)			
Emory River	<2	<2	<2	<2
Sluice Channel	<2	60.3	4	<2
Stilling Pond Effluent	<2	14.8	4.7	3.7

Conclusions:

- Fly ash collected from three locations (original source pile, the Emory River, and sluice channel) contained elevated concentrations of several metals relative to local soils and sediments, including arsenic, selenium, and barium.
- Fly ash has been modified by its residence in the Emory River in the following ways:
 - Net carbon and nitrogen profiles changed to represent accumulated natural organic matter present in the river.
 - Manganese in the source pile transformed from an oxidized to reduced state. Iron species were stable as Fe(III) oxides, and did not change.
 - Approximately 30 to 50 % of total selenium transformed from selenite (Se(IV)) to more reduced Se species after the ash was deposited in the river. Naturally forming organoselenium, present as Se(II), may be among these reduced Se forms. No evidence of selenate was found in the ash pulled from the Emory River or the sluice channel.
 - Fly ash arsenic remained predominantly as As(V), with evidence of some slight shift to reduced arsenic-thiol species.
- Selenate was only found in the waters collected from the stilling pond. Given that selenate was not detected in any of the systems preceding the stilling pond, it is hypothesized that selenium is photooxidized due to the exposure of surface waters to direct sunlight. More investigations are warranted to resolve this mechanism.

5 Physical and Chemical Characterization of Elutriate

This chapter describes the experimental results of the extended effluent elutriate tests (EET) performed on ash materials collected from the Emory River and the sluice channel in June 2009, as described in Chapter 2. EET experiments were constructed as described in Chapter 3.

Methods

Total and dissolved metals were determined as described in Chapter 4. Arsenic (III) and (V) and selenium (IV) and (VI) were also determined as described in Chapter 4. Dissolved organic and inorganic carbon was determined using a Shimadzu TOC-V analyzer with a catalytic combustion technique. Solid phase speciation of As and Se in elutriate sediments was conducted using μ -XANES as described previously in Chapter 4. Solid phase speciation of bulk metals was conducted using XANES, also described in Chapter 4. Elutriate particle size distributions were determined using a Beckman Coulter LS Series 100Q laser particle-sizer generally in accordance with the procedure described by Poppe et al. (2000). The LS100Q measures particles from 0.4 μ m to 900 μ m in size.

Geochemical modeling was conducted using the software Visual Minteq (v. 2.61; Gustafsson 2009) to calculate the speciation of dissolved constituents in solution based on their thermodynamic solubility and complexation constants. These calculations focused on Se, As, Mn, and Cr. Elemental constituents were input into the program using the analytically determined concentrations as redox couples: Se was evaluated using the redox couple $\text{HSeO}_3^-/\text{SeO}_4^{2-}$; As using the $\text{HAsO}_3/\text{AsO}_4$ couple; Mn using Mn(II), Mn(III), and Mn(IV); and Cr using the $\text{Cr}^{2+}/\text{Cr}(\text{OH})_2^{2+}$ couple, Cr(VI) was not found to be significant Cr species. An appropriate redox couple for Hg was not defined in the program, and thus was not calculated. For selenium and arsenic metals, the concentrations of species were defined based on the analytical determinations - Se (IV) and As(V) were input based on the HPLC-ICP-MS analysis. The difference in selenium or arsenic concentration (total metals subtracted by concentrations of metal species) was assigned to Se(VI) and As(III), respectively, representing a "worse-case" scenario calculation, even though neither of the latter species were detected in solution. The Cr input was the divalent cation species.

Speciation calculations were performed by allowing the pH of the system to sweep from pH 4 to 10. For each set of calculations, system Eh was fixed at either -300, -100, 100, or 300 mV. The calculations were conducted to test both the pH and redox boundary conditions in which selenium and arsenic may undergo redox changes to their more toxic species in solution.

Software constraints did not allow for the simultaneous input of all dissolved constituents in the elutriate systems. Therefore, As, Se, Mn, and Cr were tested in separate calculations in the presence of one additional constituent, added at the concentration detected in solution, to determine if the added constituent underwent a specific reaction (e.g., formed new pairs or precipitate solids). For each one of these calculations, and all subsequent calculations described in this chapter, solution anions were inputted based on the analytically determined concentrations (TIC concentrations were input as carbonate anions). For all calculations, computed species were allowed to over-saturate and produce secondary precipitates if thermodynamically appropriate. In addition, these secondary precipitates were allowed to further re-dissolve based on thermodynamic solubility.

Preliminary calculations showed new species produced when Se was modeled in the presence of either Zn, Ni, or Cu, yet the predicted activities of these species were so low as to have virtually no effect on the activity of the major species predicted.

Results

The purpose of the elutriate tests described above was to simulate the extent of metals in the fly ash samples (Table 5) that might be released during dredging activities under extreme conditions. Dissolved metals concentrations in the aerated and nitrogen bubbled (oxic and anoxic regime) experiments for the elutriate tests created with Emory River and sluice channel waters and fly ash are shown in Figures 23-28.

The solution data (Figures 23-26) show the concentration profiles of dissolved elements over the 240-hr elutriate test. The dissolved element concentrations span about 5 orders of magnitude with the major cations sodium, magnesium, potassium, and calcium remaining relatively constant over the 240-hr period at 1 - 10 mg/L or above. Some elements (e.g., beryllium, thallium, cadmium, chromium, nickel, and silver) were never detected above the 1 µg/L reporting limit, while others like barium, arsenic, manganese, selenium, and vanadium exhibit trends in

concentration over the EET experiment. For clarity, plots containing expanded scales of these latter elements are shown in Figures 27 and 28. These data show that arsenic concentrations in the Emory River elutriate reached about 50 $\mu\text{g/L}$, while arsenic concentrations in the sluice channel elutriates exceeded 80 $\mu\text{g/L}$ by 240 hr of gas bubbling. Vanadium concentrations remained approximately constant in the sluice channel elutriates over the 10-day experiment, while increasing in the Emory River elutriates from about 10 to over 30 $\mu\text{g/L}$. Selenium concentrations increased in all four elutriate systems over the 10-day experiment, from <1 to 5 $\mu\text{g/L}$ in the Emory River systems and from 5 to 13 $\mu\text{g/L}$ in the sluice channel elutriates.

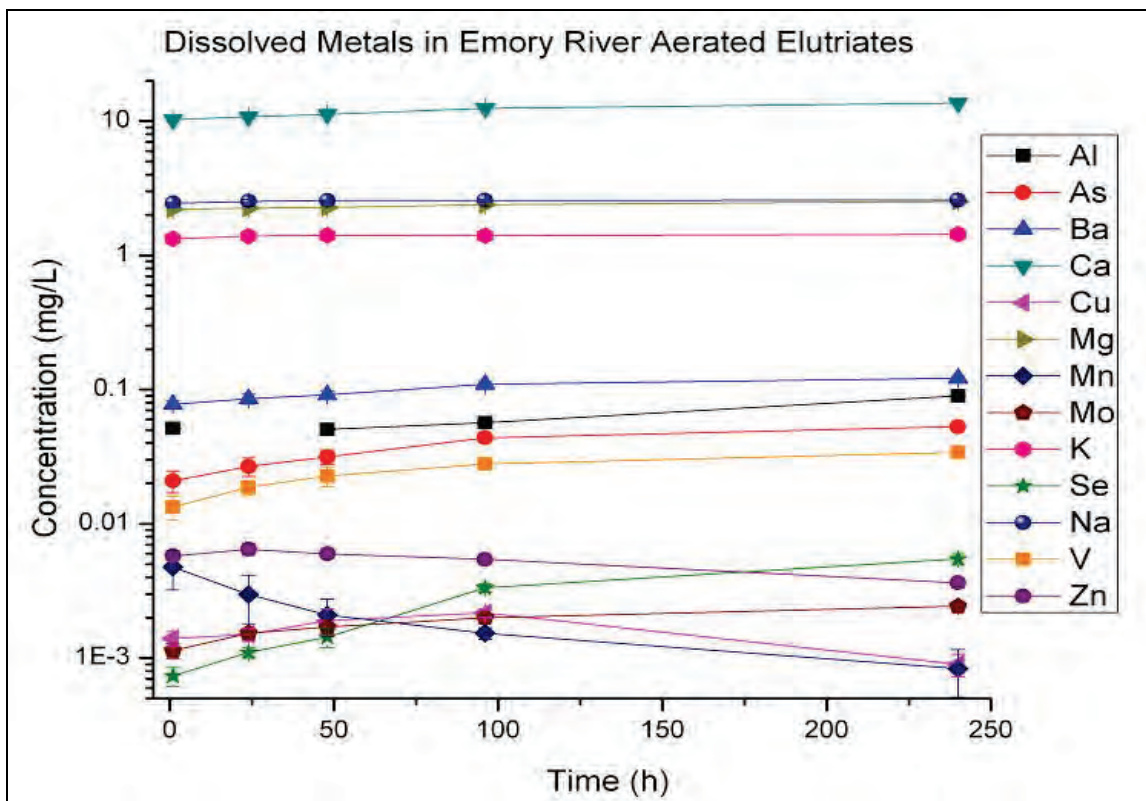


Figure 23. Dissolved metals concentrations in the Emory River oxic regime (i.e., bubbled with air) elutriate as a function of time. Error bars represent the standard deviation of triplicate elutriate preparations.

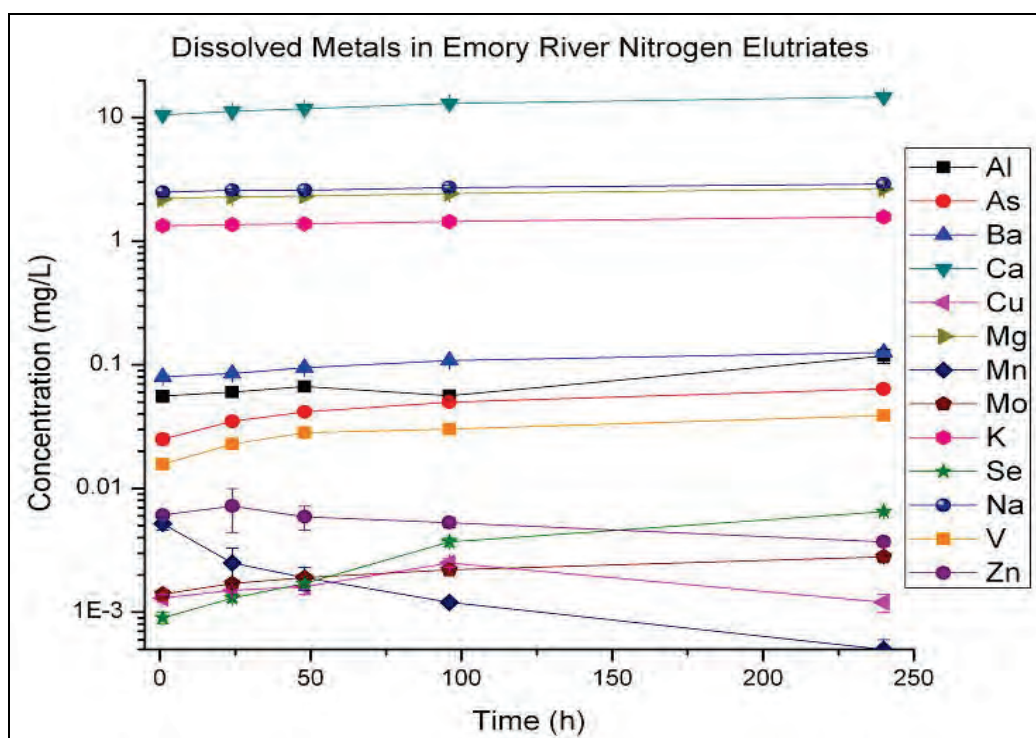


Figure 24. Dissolved metals concentrations in the Emory River anoxic regime (i.e., bubbled with nitrogen gas) elutriate as a function of time. Error bars represent the standard deviation of triplicate elutriate preparations.

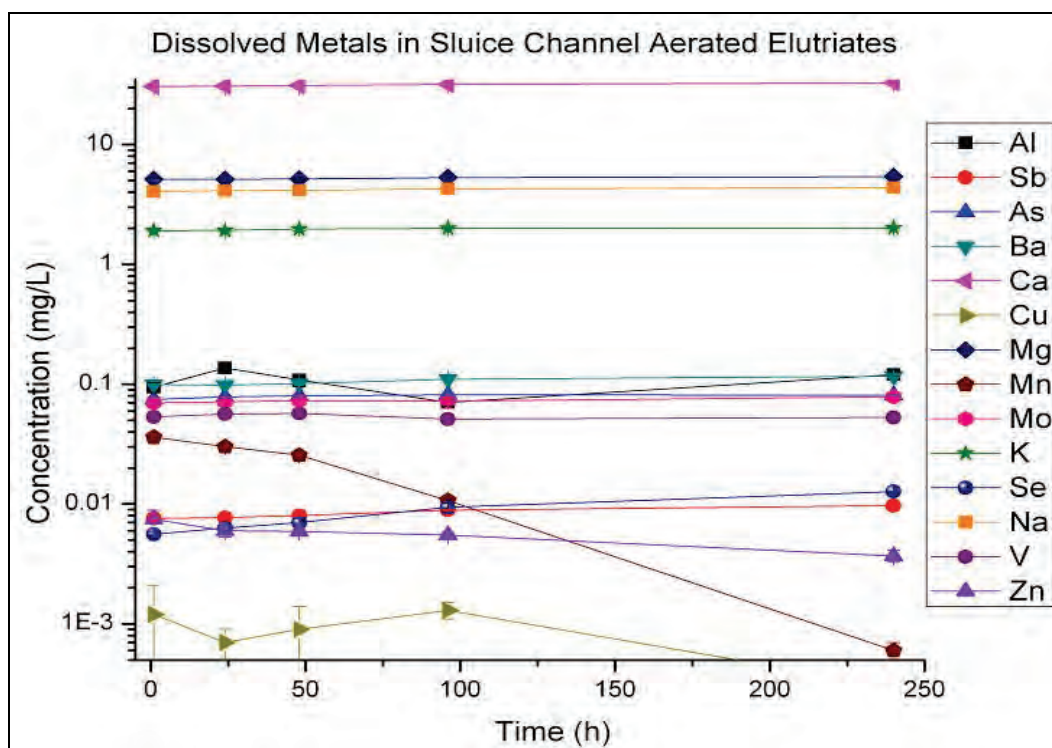


Figure 25. Dissolved metals concentrations in the sluice channel oxic regime elutriate as a function of time. Error bars represent the standard deviation of triplicate elutriate preparations.

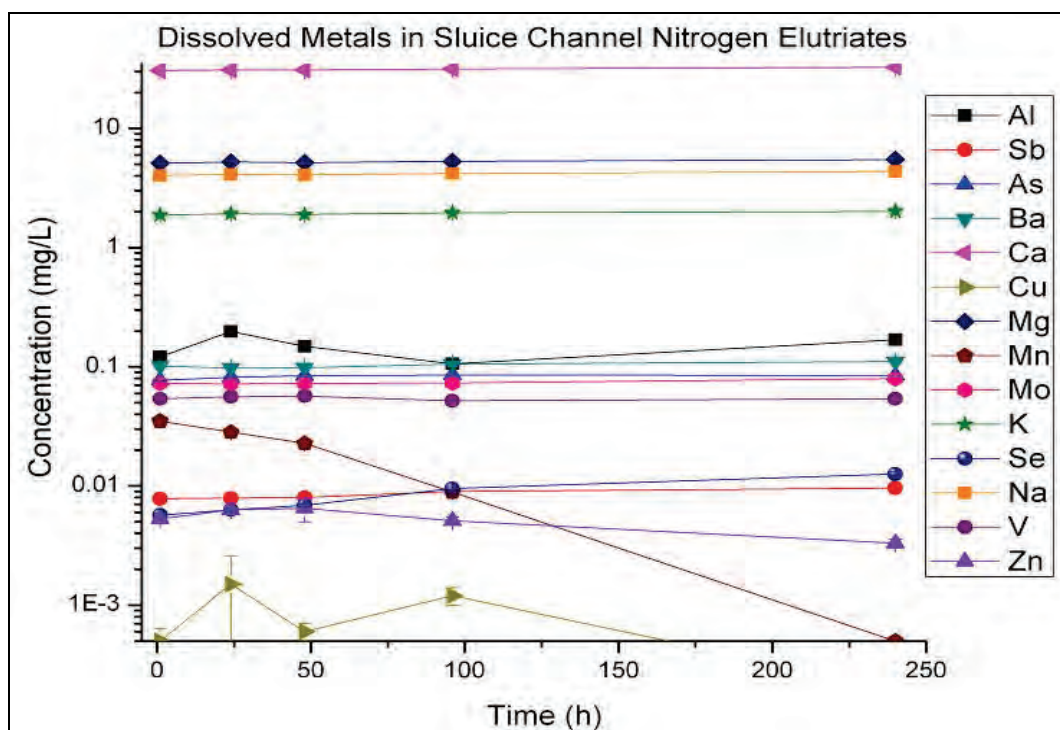


Figure 26. Dissolved metals concentrations in the sluice channel anoxic regime elutriate as a function of time. Error bars represent the standard deviation of triplicate elutriate preparations.

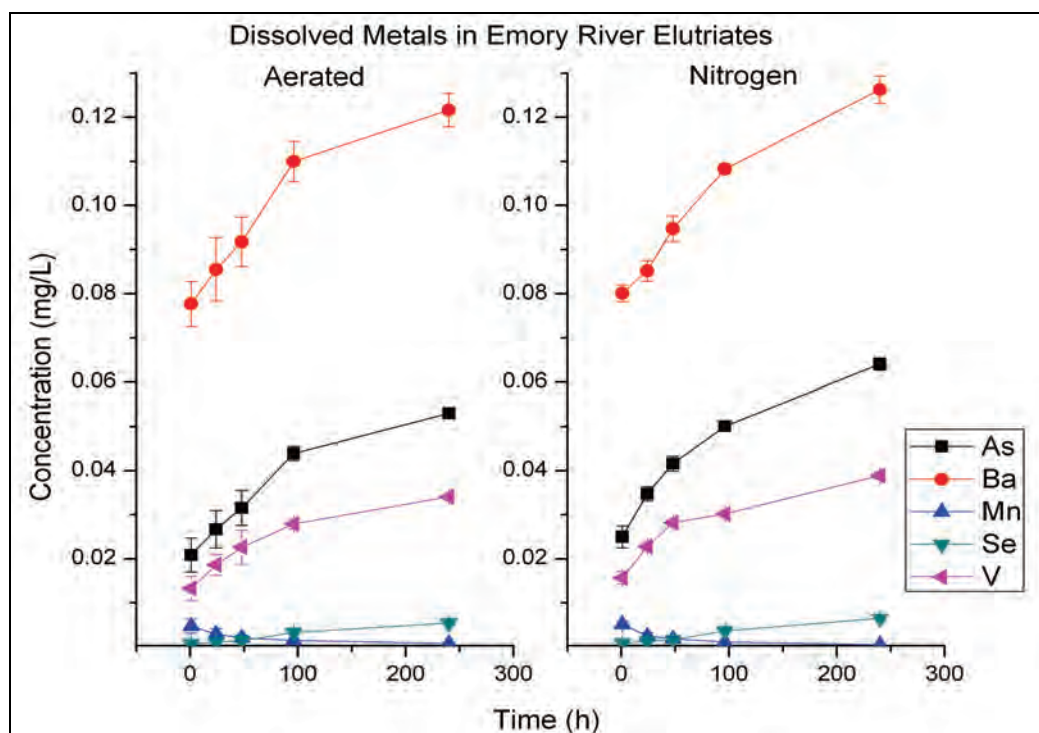


Figure 27. Expanded view of dissolved metals concentrations in the Emory River elutriates as a function of time. Error bars represent the standard deviation of triplicate elutriate preparations.

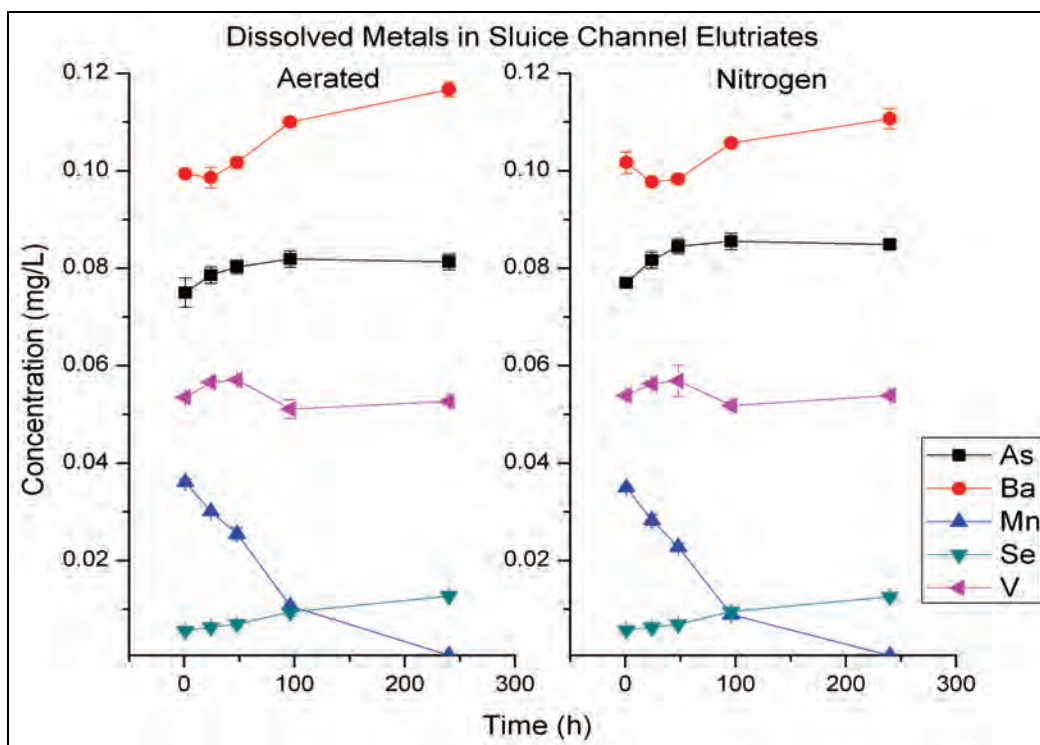


Figure 28. Expanded view of dissolved metals concentrations in the sluice channel elutriates as a function of time. Error bars represent the standard deviation of triplicate elutriate preparations.

The total concentration of dissolved organic carbon (Figure 29) remained relatively constant at 3 mg/L over the first 96 hr of the EET, followed by a substantial increase by 240 hr in both the Emory River and sluice channel elutriates. The increase in total organic carbon between 96 and 240 hr suggests that the efforts to keep the ash materials suspended in solution over the EET stimulated microbial activity, which after an initial lag phase, may have exhibited an effect on the system. Note that this behavior is equally apparent in both the oxic and anoxic regime (air- and nitrogen-bubbled) systems. Expected metal behaviors based on geochemical speciation modeling are discussed later in this section.

In addition to the total dissolved concentrations, HPLC-ICP-MS was utilized to determine the concentrations of As(III) and As(V) (Figure 30) and Se(IV) and Se(VI) (Figure 31) in solution over the course of the 10-day elutriate experiment. These data show possible shifts in metal speciation with time, particularly as affected by the oxic and anoxic regime treatments on the systems. The data demonstrate the persistent redox stability of the elutriate solution over the course of the 10-day study. For example, no Se(VI), e.g., selenate, was detected in solution in any of the elutriates, even after 10 days of oxic regime treatment. The speciation data

show the measured increase in dissolved selenium concentration was attributed solely to the increase in Se(IV), e.g., selenite. This suggests that even with aeration, the redox potential of the system is poised such that selenite is the stable species. Similarly, speciation data showed that the measured increase in total arsenic was attributed to an increase in arsenic (V), e.g., arsenate. No As(III) was observed in these systems, even in the anoxic regime experiments.

Figures 32 and 33 show the measured Eh and pH values for the 10-day elutriate experiments. Little variability is observed between the various oxic and anoxic regime elutriates. Variability in Eh drops approximately 50 mV in all the systems from 1 to 24 hr, followed by a slow increase in Eh to near 275 mV by 240 hr. The pH of all the elutriates held between 7.25 and 7.75 until 48 hr, after which the pH increases approximately 1.5 units. Due to the low concentrations of redox-active elements (e.g. Fe, Mn) in these systems, it is hypothesized that the redox potential may be strongly influenced by organic matter and oxygen produced by biological activity. Furthermore, the increase in pH could be due to the biological production of alkalinity. Biological production of oxygen could also explain the similarities observed between the oxic and anoxic regime elutriate.

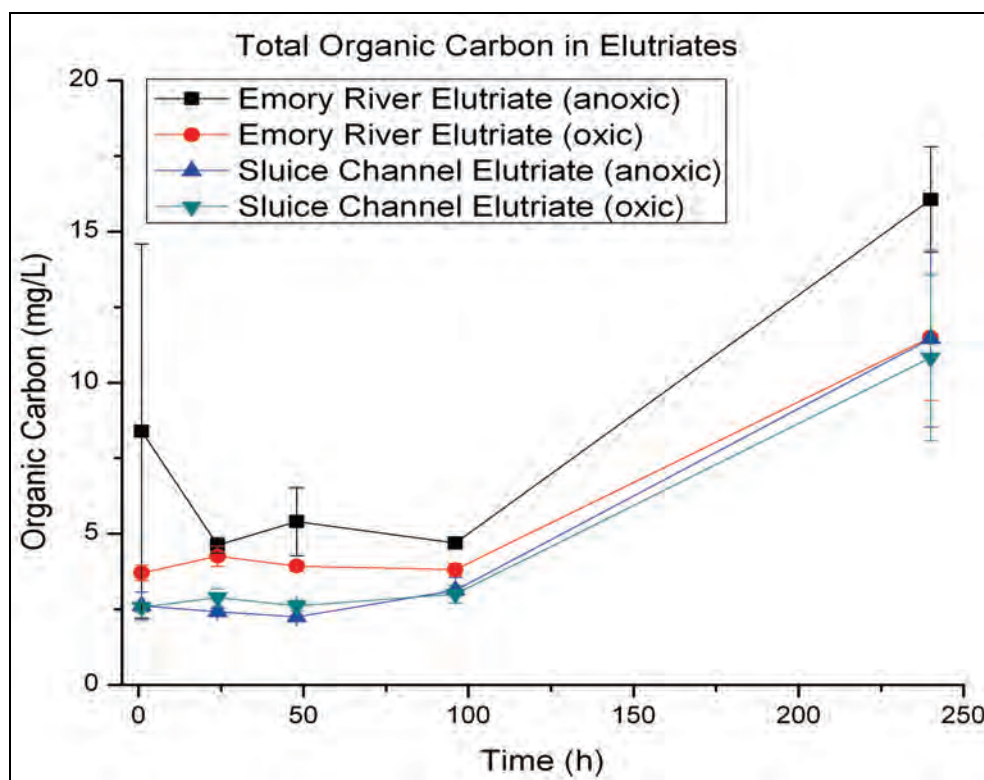


Figure 29. TOC concentrations in elutriate waters over the 10-day preparation period. Error bars represent the standard deviation of triplicate elutriate preparations.

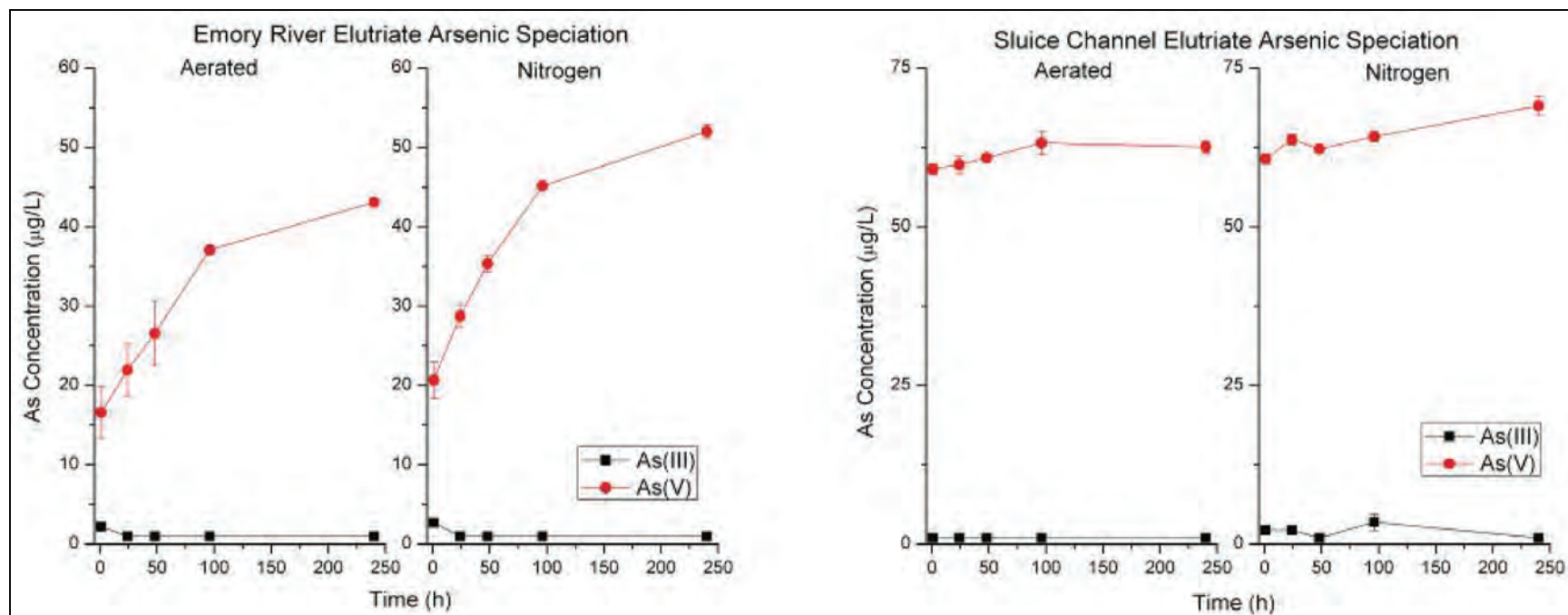


Figure 30. Arsenic speciation in the oxic and anoxic regime Emory River and sluice channel elutriate experiments. Error bars represent the standard deviation of triplicate elutriate preparations. Non-detect concentrations of arsenic species ($<2 \mu\text{g/L}$) are plotted as one-half the detection limit (i.e. $1 \mu\text{g/L}$).

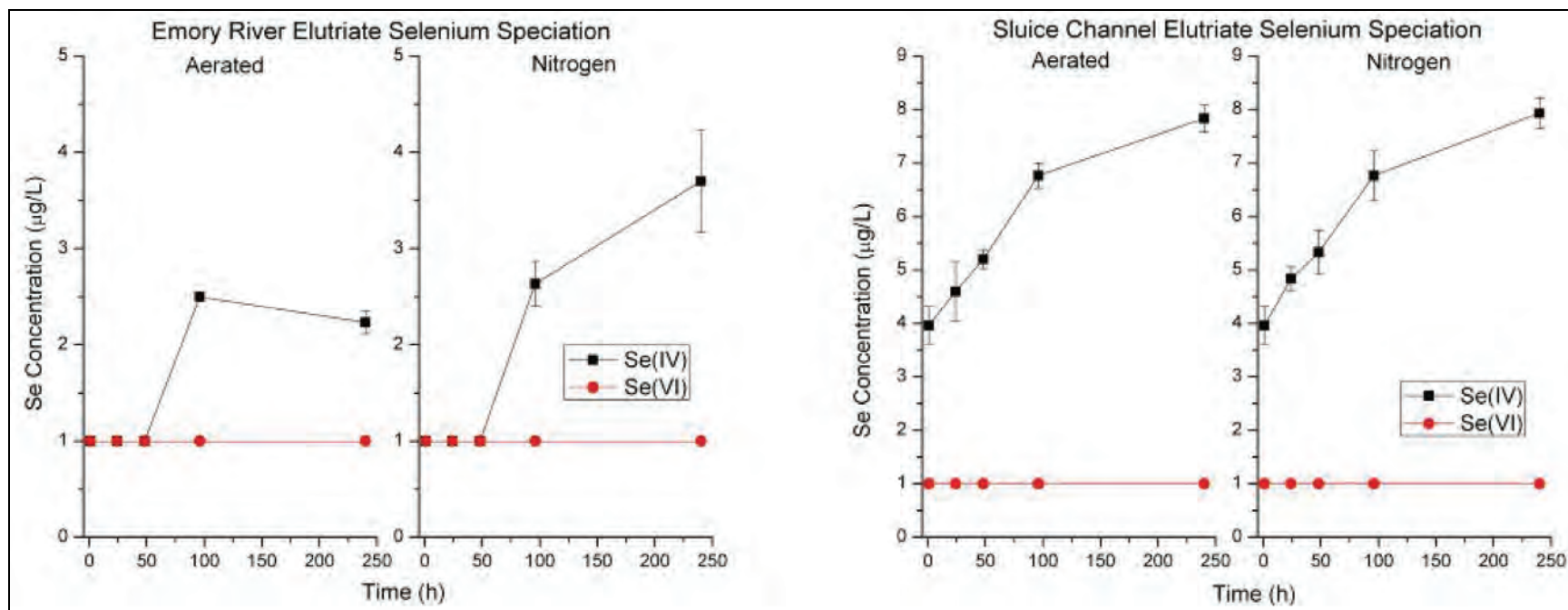


Figure 31. Selenium speciation in the oxic and anoxic regime Emory River and sluice channel elutriate experiments. Error bars represent the standard deviation of triplicate elutriate preparations. Non-detect concentrations of selenium species ($<2 \mu\text{g/L}$) are plotted as one-half the detection limit (i.e. $1 \mu\text{g/L}$).

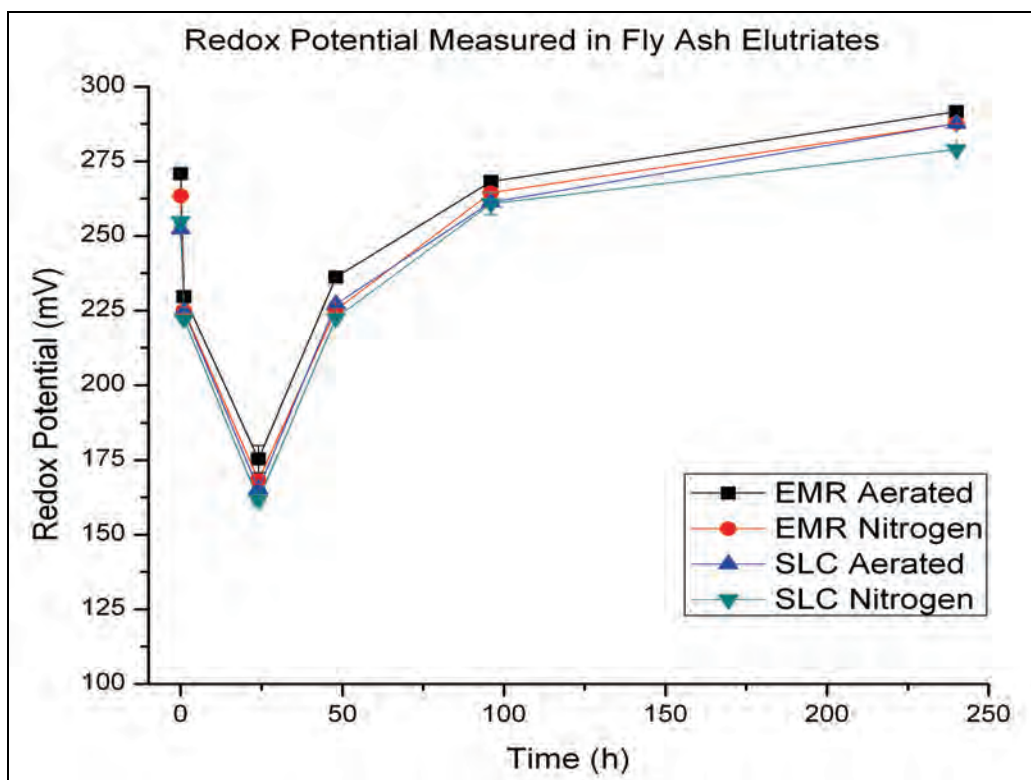


Figure 32. Eh values measured over the course of the 10-day elutriate experiment. Measured Eh values have been adjusted to compensate for the platinum electrode having a silver:silver chloride reference electrode (200 mV added).

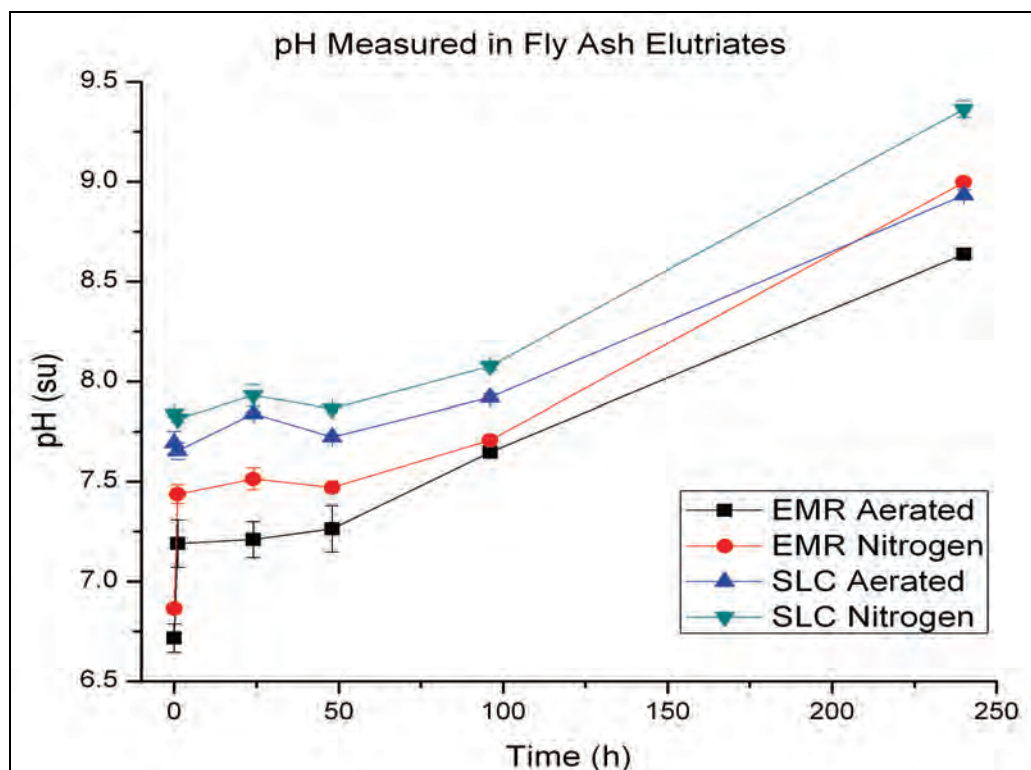


Figure 33. pH values measured over the course of the 10-day elutriate experiment.

Solid-phase metal speciation

Bulk XANES analysis for Mn in the ash samples (see Figure 6) shows the effect of the extensive air bubbling (oxic regime treatment) on the ash. The data show a noticeable shift in the Mn XANES spectra, from containing predominantly reduced Mn species to a partially oxidized Mn species in both the Emory River and sluice channel systems. Therefore, this provides evidence that the system did undergo oxidation to some extent, even though the solution redox remained relatively constant. This result also explains the reduction in dissolved Mn over the 240-hr period as shown in Figures 27 and 28.

Interestingly, bulk Fe XANES (see Figure 7) showed relatively minor change in the Fe redox state over the 240-hr oxic regime period. The elutriate Fe species (see Table 11) remained relatively stable, similar to that of the source pile. Thus, the data indicate that the Mn in the ash was responsive to the treatment conditions, not the Fe phases. Figures 34 and 35 show the stability diagrams for Fe and Mn oxides, respectively. Based on the pH and redox measurements (Figures 32 and 33), Fe(III) was expected to remain stable while EET conditions put the system close to the redox barrier between Mn(II) and Mn(IV). Similar observations have been

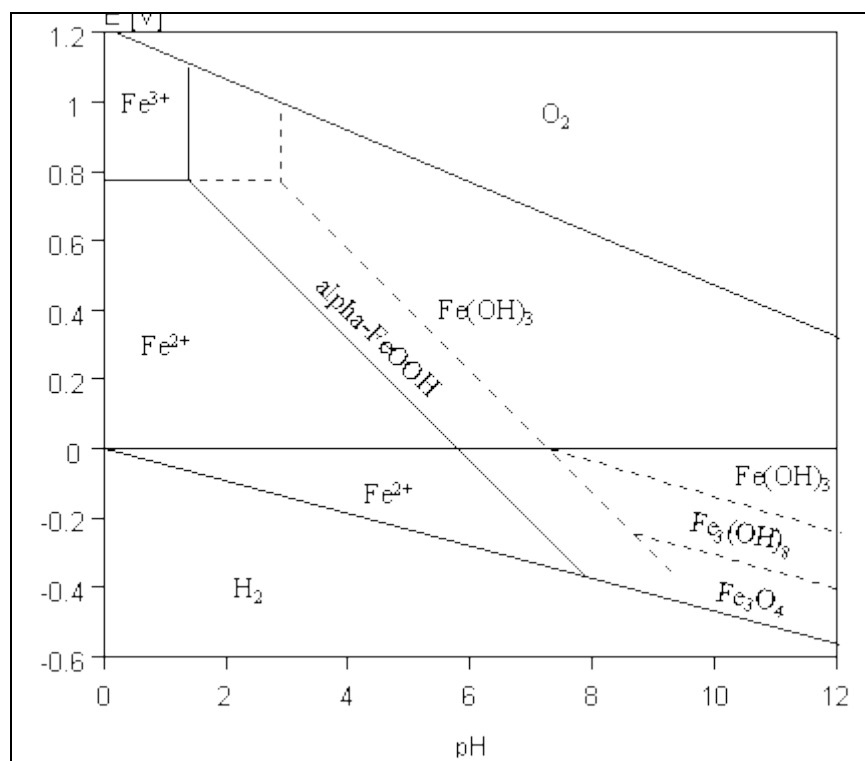


Figure 34. Pourbaix (Eh – pH) stability diagram for iron oxides.

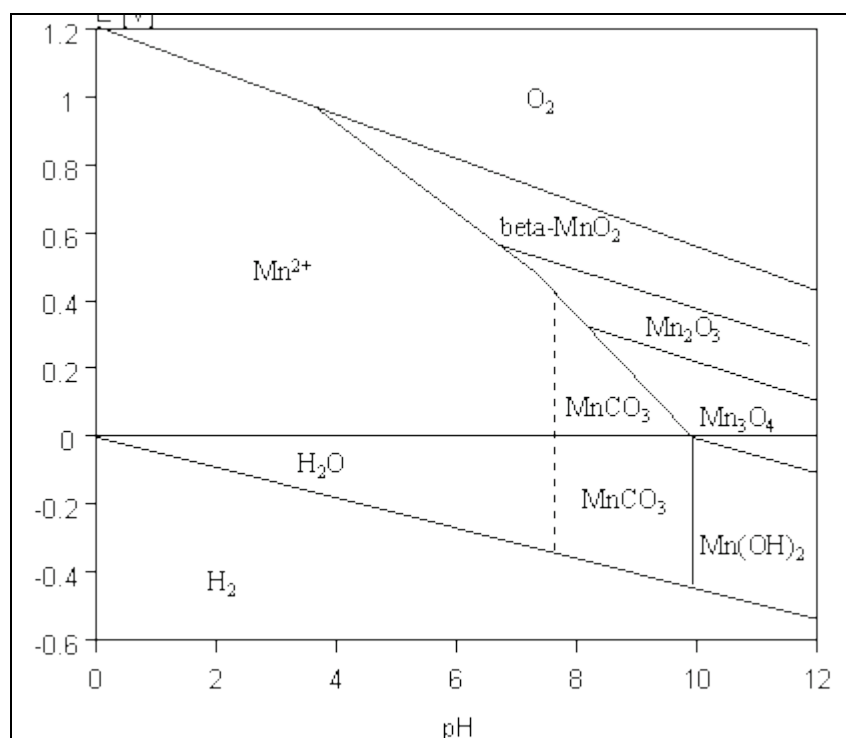


Figure 35. Pourbaix (Eh - pH) stability diagrams for manganese oxides.

previously reported for dissolved iron and arsenic species in poised redox systems (Bednar et al. 2005). Thus, in the Emory River and sluice channel systems, Mn serves as a more responsive indicator of potential shifts in the river conditions that may be associated with redox changes in Se and As. The formation of oxidized Mn in the elutriate solid samples is in agreement with the decrease in the amount of total dissolved Mn in the elutriate waters.

Bulk XANES analysis shows arsenic (Figure 36) in the EET systems mainly as the As(V) species after 240 hr of oxic regime treatment. Evidence was also observed for 3 to 12% arsenite in the Emory River and sluice channel elutriates, respectively, whether treated with an oxic or anoxic regime. The data suggest increasing levels of arsenite as the ash moves from the river to the sluice channel through dredging, although the mechanism for this transformation is unclear.

Bulk XANES data (Figure 37) determined selenium speciation in the EET systems as approximately 40-80% “reduced” selenium (probably organoselenium) and 20-60 % selenite. This proportion of covalently bound Se is similar to that observed in Chapter 4, suggesting that this form of Se may be chemically stable in the river system.

μ -XANES analysis was conducted on sediments collected from the extended elutriate experiments after bubbling with gas for 240 hr. Given time constraints associated with this work, investigations focused on the sediments treated with the oxic regime (bubbled with air), to understand the potential for Se oxidation and Se(VI) release from the elutriate systems. The data showed that As(V) made up the predominant arsenic species in both the Emory River and sluice channel elutriates (Figure 38). Evidence was also found for As(III) in the μ -XANES spectrum for one site on the sluice channel elutriate sediments, yet As(V) remained the major arsenic species in the ash.

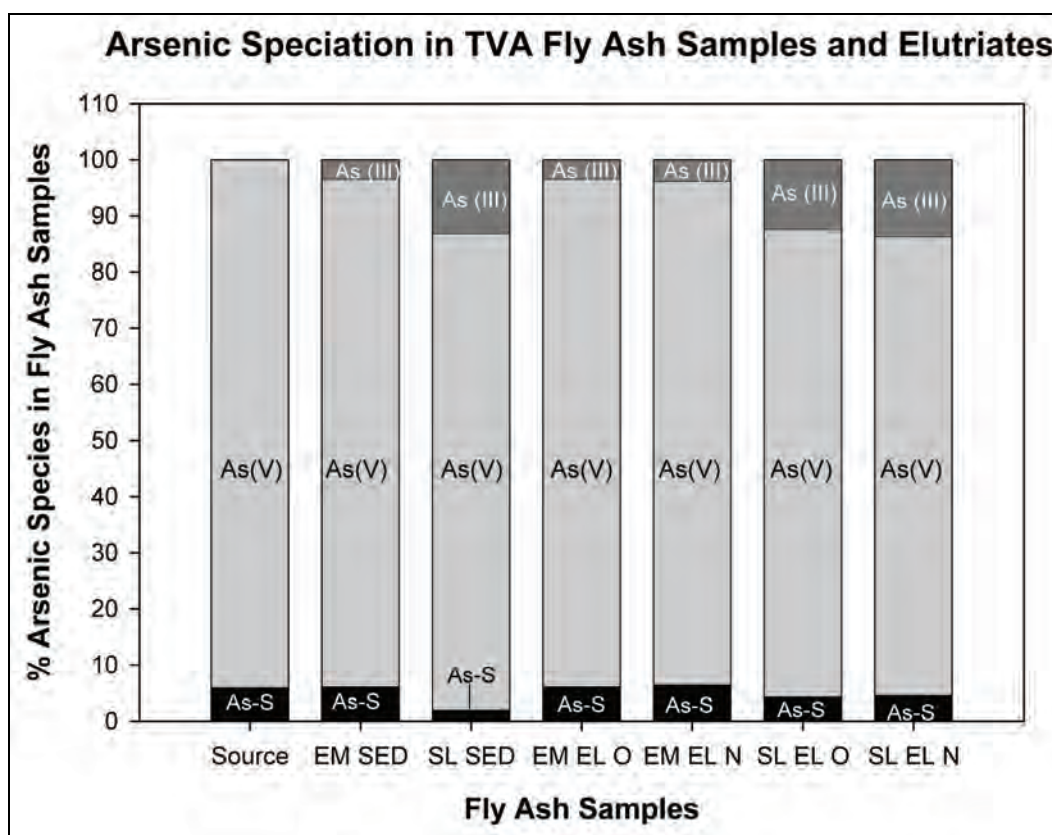


Figure 36. Results from linear combination fits of arsenic XANES data on bulk ash and elutriate samples. Source = source pile, EM SED = Emory River sediment, SL SED = sluice channel sediment, EM EL O = Emory River elutriate treated with oxic regime, EM EL N = Emory River elutriate treated with anoxic regime, SL EL O = sluice channel elutriate treated with oxic regime, and SL EL N = Sluice Channel Elutriate treated with anoxic regime. As(V) = arsenate, As(III) = arsenite and As-S is arsenic bound to sulfur.

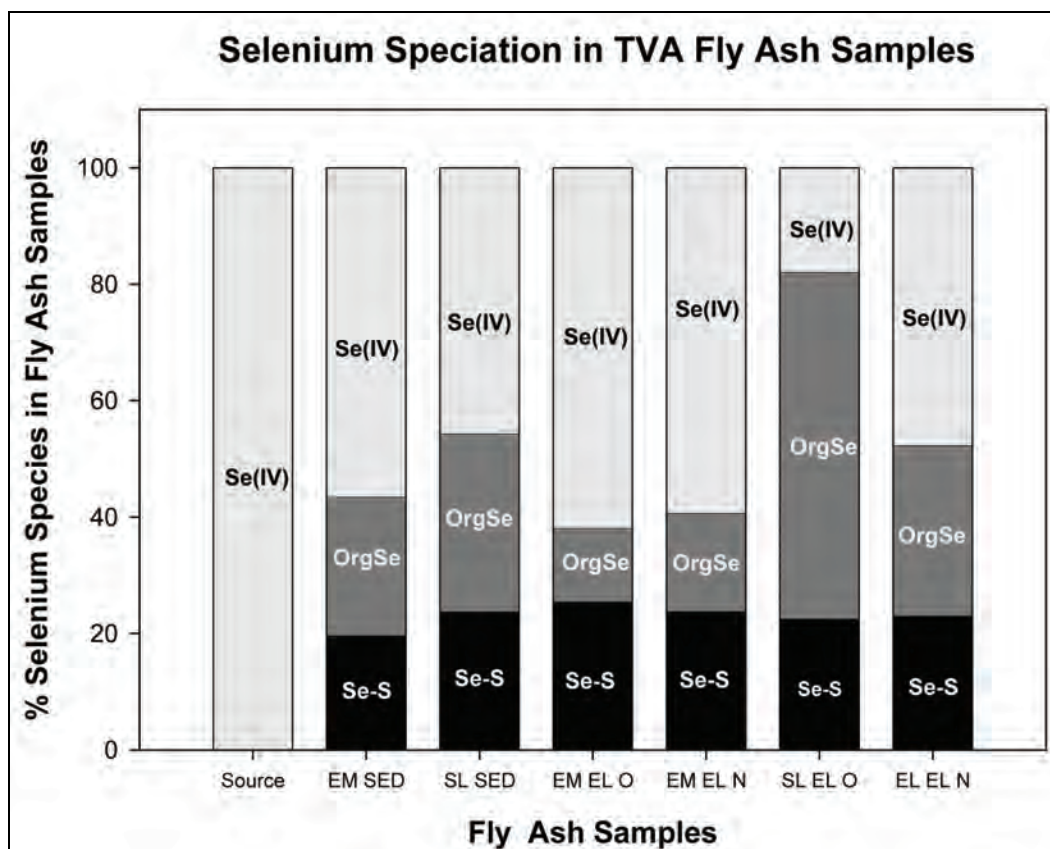


Figure 37. Results from linear combination fitting of selenium XANES on bulk Emory River and sluice channel ash and elutriate samples. Source = source pile, EM SED = Emory River sediment, SL SED = sluice channel sediment, EM EL O = Emory River elutriate treated with oxic regime, EM EL N = Emory River elutriate treated with anoxic regime, SL EL O = sluice channel elutriate treated with oxic regime, and SL EL N = sluice channel elutriate treated with anoxic regime. Se(IV) = selenite, OrgSe = Se bound to thiol bearing C-compounds, and Se-S is selenium bound to sulfur.

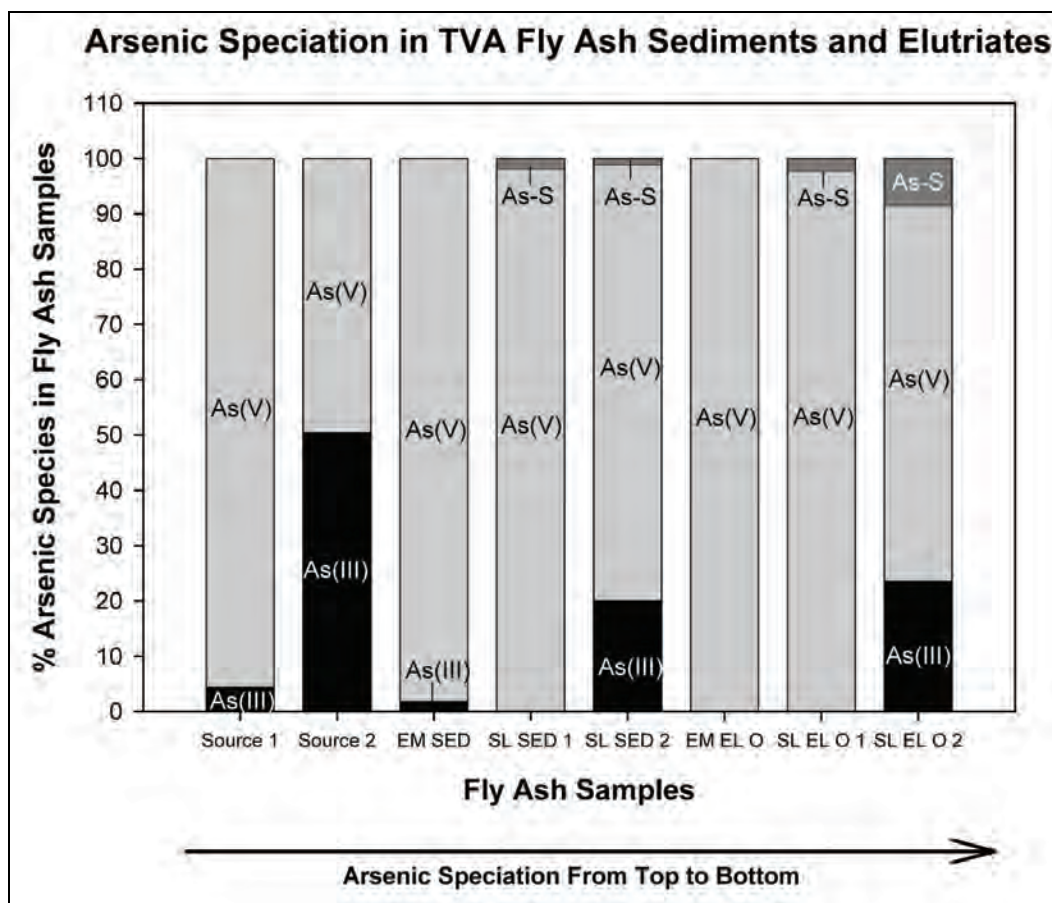


Figure 38. Results from linear combination fittings of μ -XANES data collected at the arsenic K-edge on discrete locations in the ash and treated with oxid regime elutriate samples. Fittings refer back to Figure 15.

Se μ -XANES analysis of the Emory River elutriate sediments (Figure 39) showed evidence for both Se(IV) and “reduced” Se species (organoselenium as discussed previously). However, the presence of a micro-domain containing Se(VI) in the Emory River elutriate sediments confirms the possibility of obtaining Se(VI) through extended oxidation, although no Se(VI) was detected in solution during any of the elutriates. Thus, if Se(VI) was released from the elutriate sediments, it was released at concentrations undetectable at the 2-ppb limit. For the sluice channel elutriates, no evidence of Se(VI) was found, only mixtures of “reduced” Se and Se(IV).

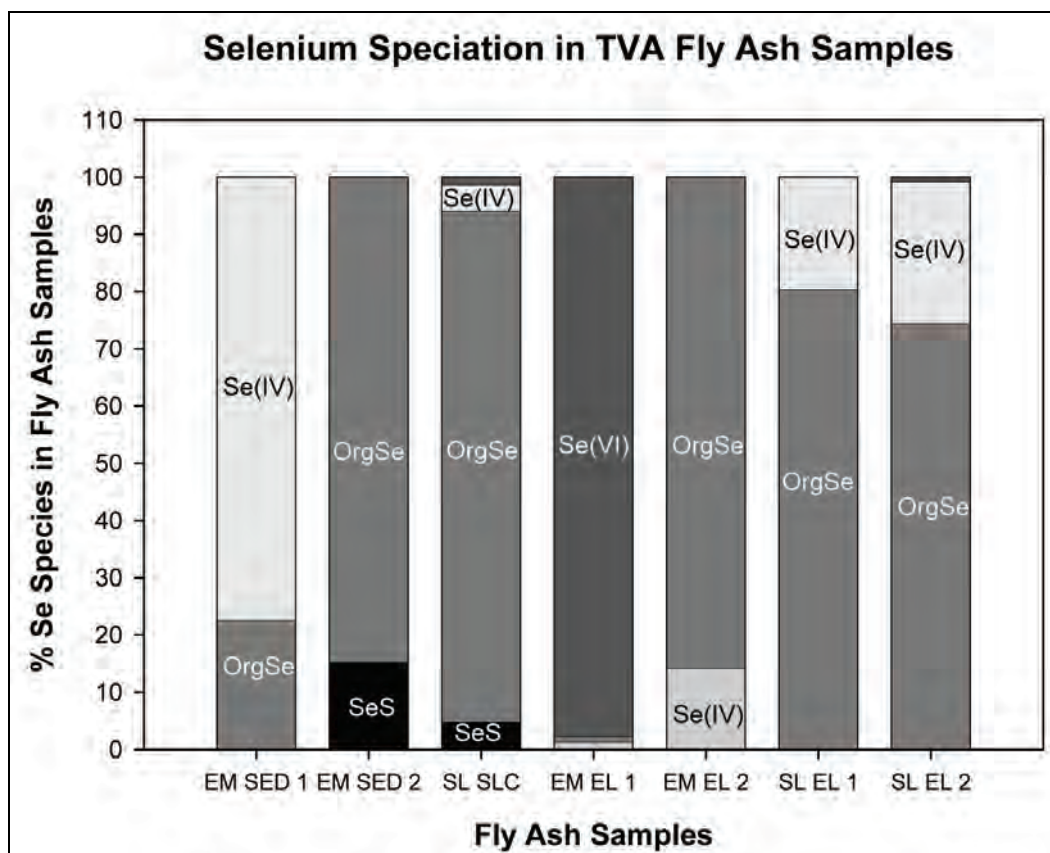


Figure 39. Results from linear combination fittings of μ -XANES data collected at the selenium K-edge on discrete locations in the Emory River and sluice channel ash and oxic regime Emory River and sluice channel elutriate samples. Source = source pile, EM SED = Emory River sediment, SL SED = sluice channel sediment, EM EL = Emory River elutriate, and SL EL = sluice channel elutriate. The numbers refer to the number of XANES scans per sample. Se(IV) = selenite, OrgSe = Se bound to thiol bearing C-compounds, and Se-S is selenium bound to sulfur.

Sediment particle size distributions during the EET

Figures 40 and 41 show particle size distribution data obtained during the 240-hr bubbling period for the Emory River and sluice channel elutriates, respectively. The data show a slight shift in the particle size distribution curves toward smaller particle sizes with prolonged gas bubbling. This shift was more pronounced in the sluice EET than the Emory River EET, particularly for the larger particle sizes. Such shifts may be indicative of the effect of prolonged agitation of the sediment materials, and successful disaggregation of larger particles. Also, this effect may be related to the difficulty of fully suspending the ash material during the EET experiments. With time, ash material accumulating on the bottom of the EET vessels tended to “concrete” or form a crust so that it was necessary to periodically break up by mechanical stirring. Thus, particle size distributions would be

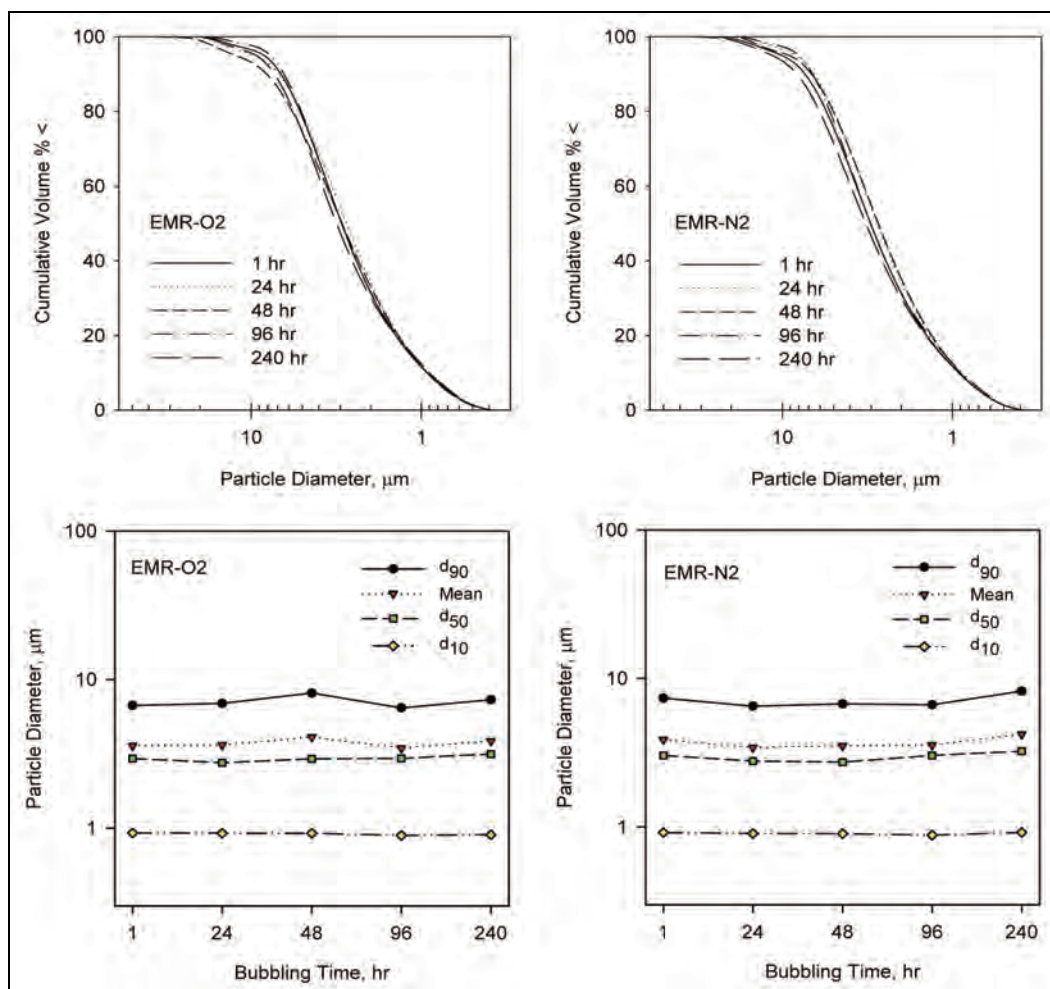


Figure 40. Particle size data for the Emory River elutriate experiments.

expected to have shifted slightly due to the removal of larger aggregates in the crust, which became difficult to resuspend. In any case, the data show that the prolonged bubbling did have a dramatic effect on the particle size distribution (better defined as a one to two order of magnitude difference). It is unclear to what degree such a shift in particle size distribution may have impacted the dissolution of Se and As.

Geochemical modeling

While the above studies provide information relevant to the species of arsenic and selenium, the actual chemistry of these metals is controlled by the existence of pairs and complexes made up from these particular species. Given the almost impossible task of analytically determining these pairs and complexes, geochemical modeling was used to predict the constituents based on reported literature values describing solubility and pairing complexation constants.

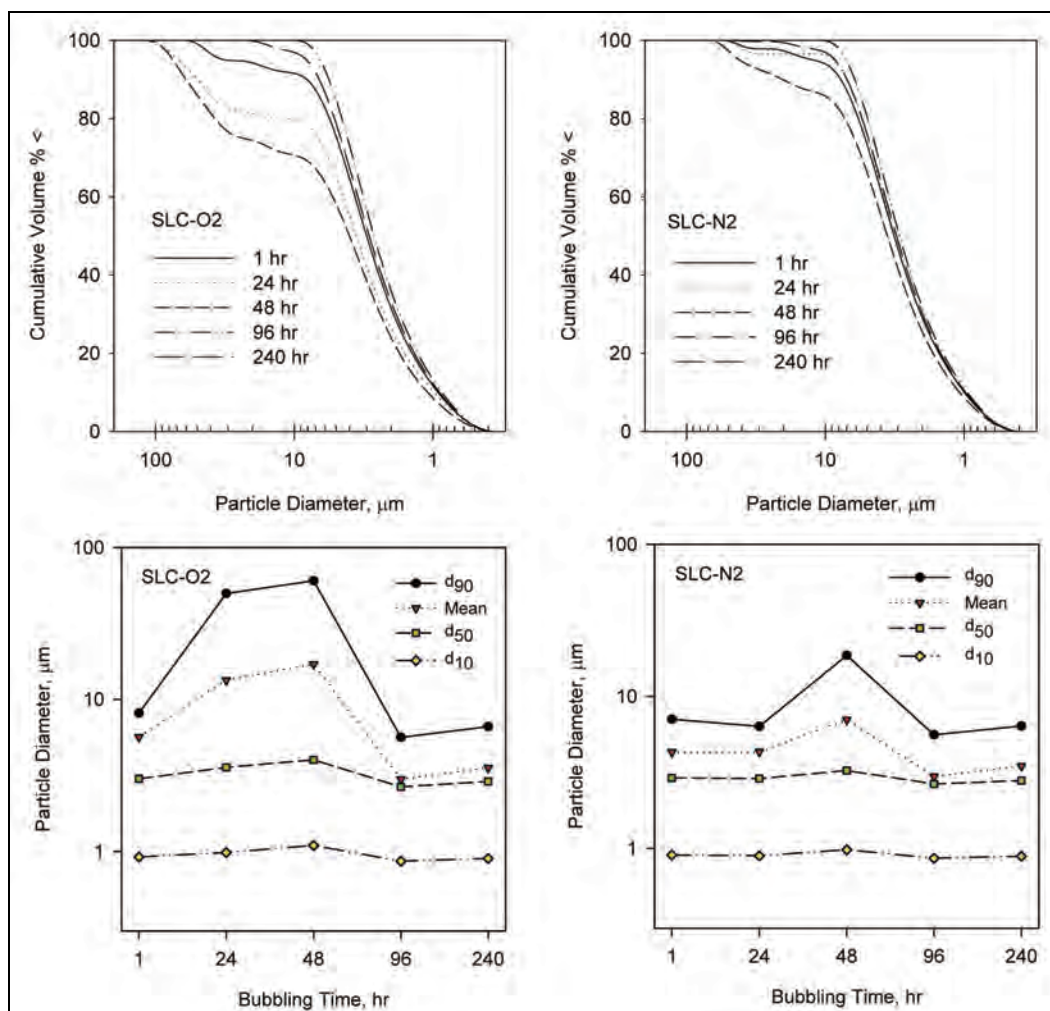


Figure 41. Particle size data for the sluice channel elutriate experiments.

Manganese. Equilibrium modeling of Mn in elutriate systems

(Figures 42-45) shows the main Mn species as Mn^{2+} , with MnCO_3^0 aqueous pair becoming important at $\text{pH} > 8$ at all redox ranges tested. According to this calculation, Mn(III) and Mn(IV) were not predicted to be stable in the measured elutriate conditions, in spite of evidence of oxidation under the oxic regime systems. The evidence suggests that the redox exhibited during the elutriate system actually represents a pE buffering capacity of this system, around the quantity of Mn in the system. If the EET was extended to complete Mn oxidation, the bulk Eh would have increased accordingly.

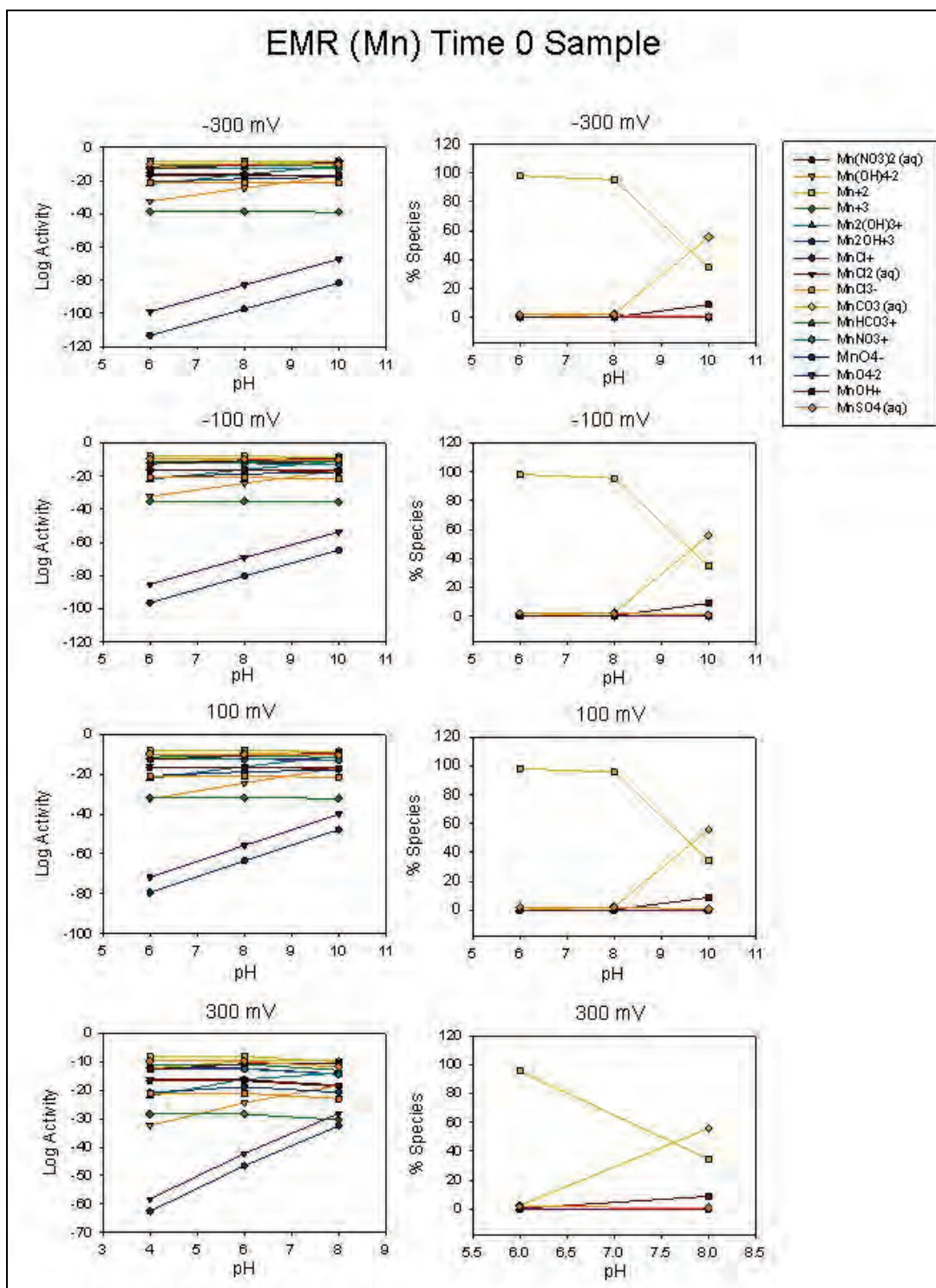


Figure 42. Results from geochemical modeling predicting manganese pairs and complexes in the Emory River elutriate ($t = 0$ hr), based on total Mn determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

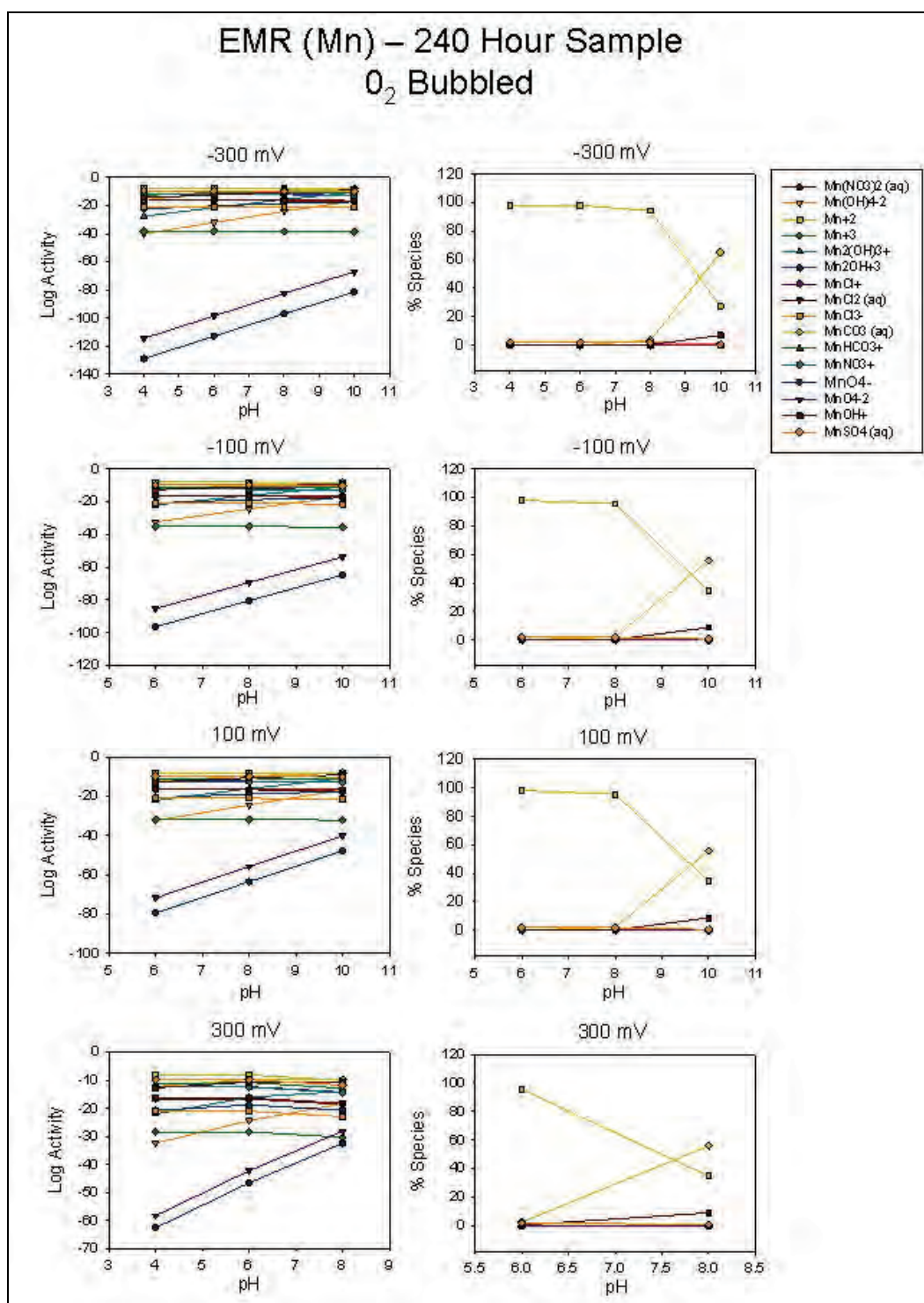


Figure 43. Results from geochemical modeling predicting manganese pairs and complexes in the Emory River elutriate (t = 240 hr), based on total Mn determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

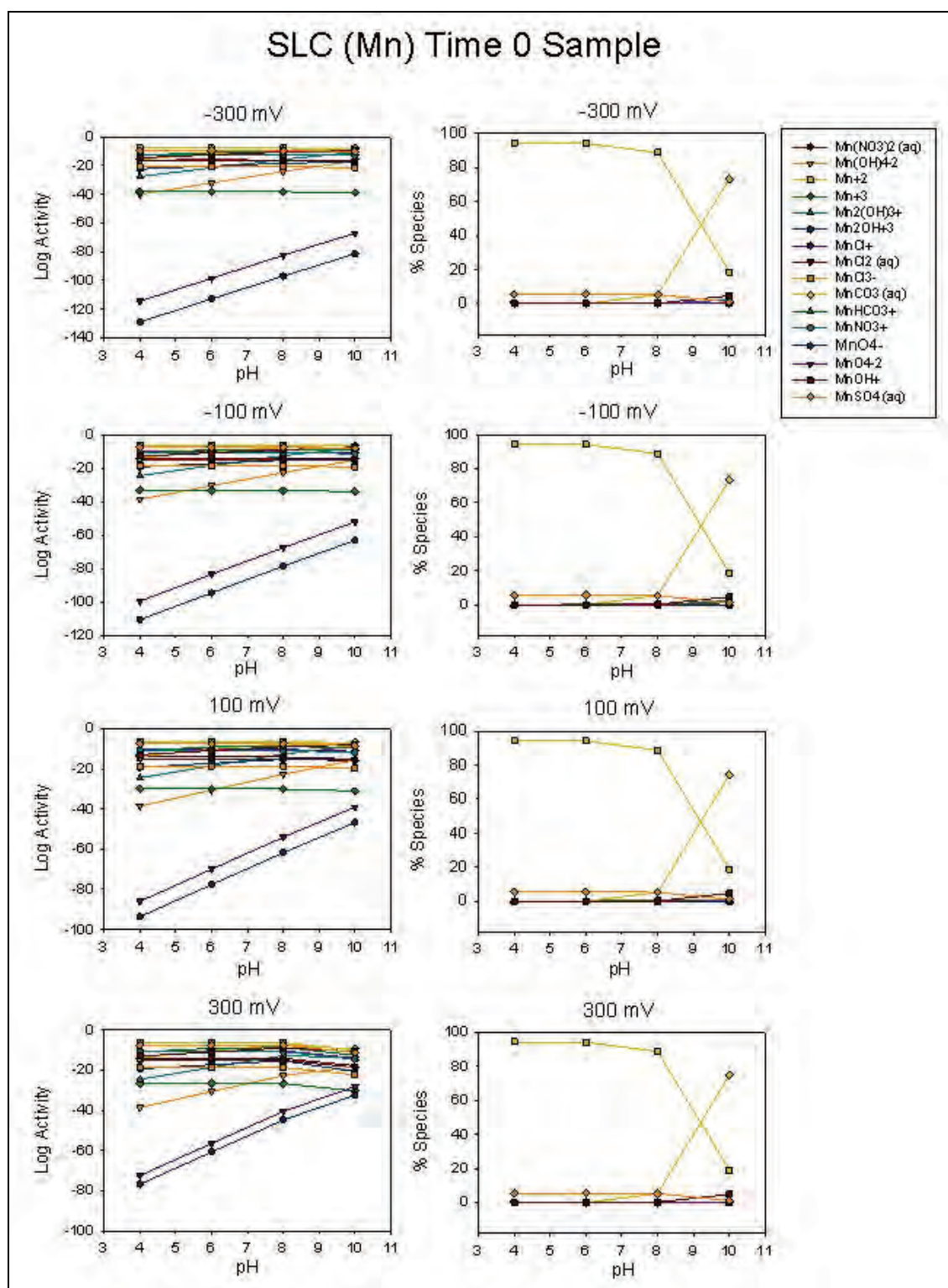


Figure 44. Results from geochemical modeling predicting manganese pairs and complexes in the sluice channel elutriate ($t = 0$ hr), based on total Mn determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

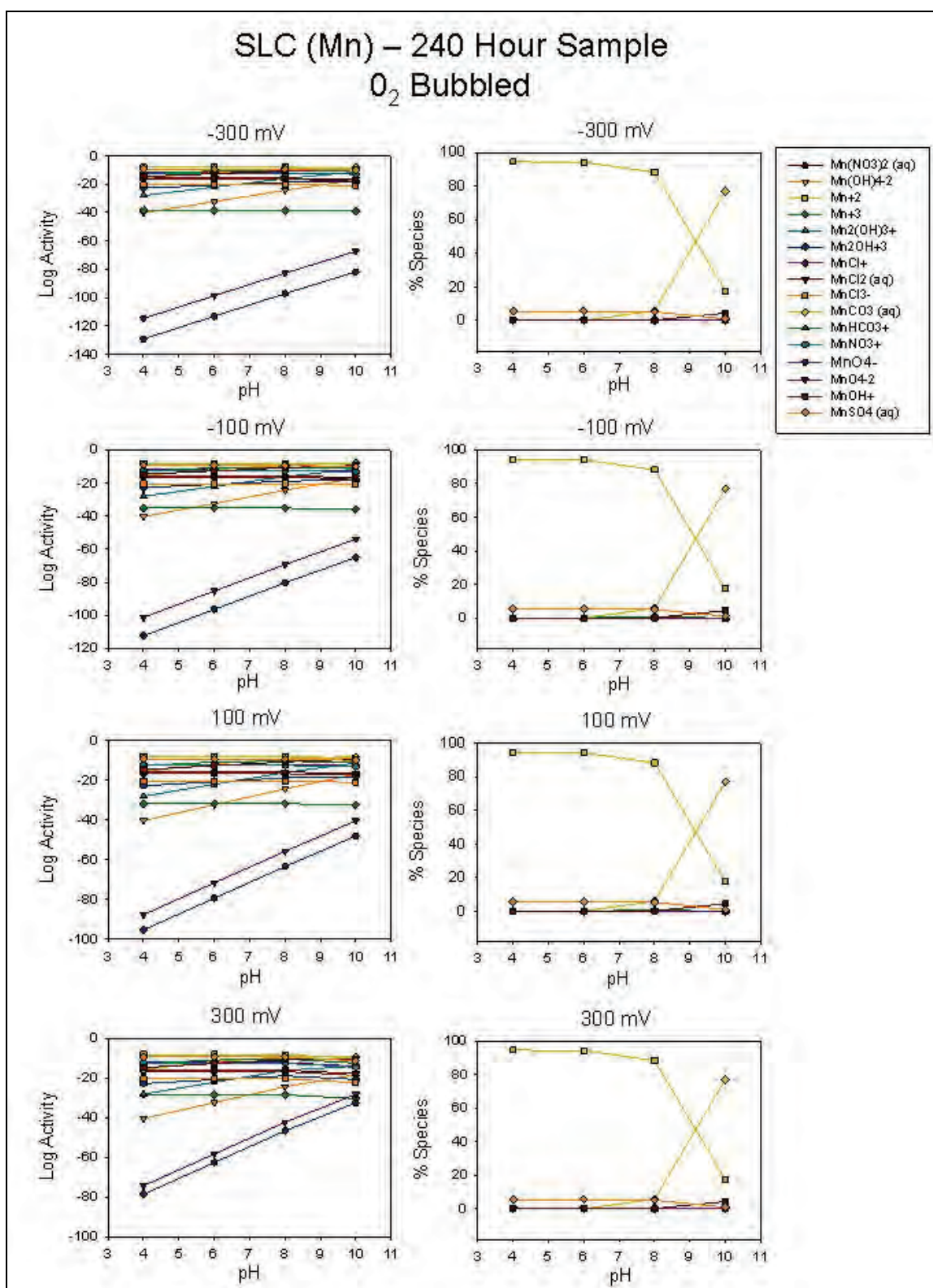


Figure 45. Results from geochemical modeling predicting manganese pairs and complexes in the sluice channel elutriate (t = 240 hr), based on total Mn determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

Chromium. Equilibrium modeling of chromium (Figures 46 and 47) was limited to detection of the metal at $t = 240$ hr. In general, the modeling predicted dominance of Cr(II) complexes at acid pH and Cr(III) complexes at basic pH values for all redox conditions tested.

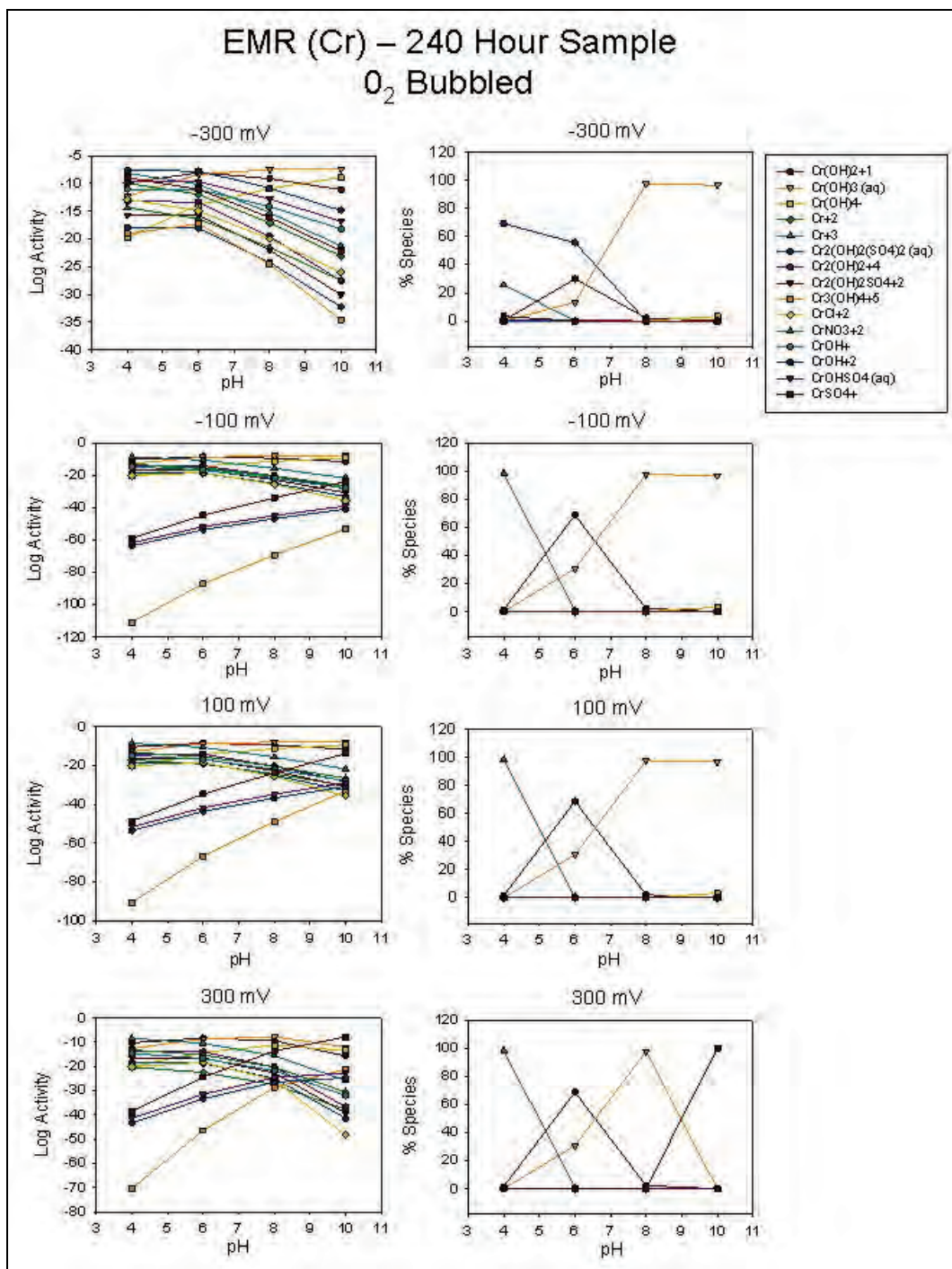


Figure 46. Results from geochemical modeling predicting chromium pairs and complexes in the Emory River elutriate ($t = 240$ hr), based on total Mn determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

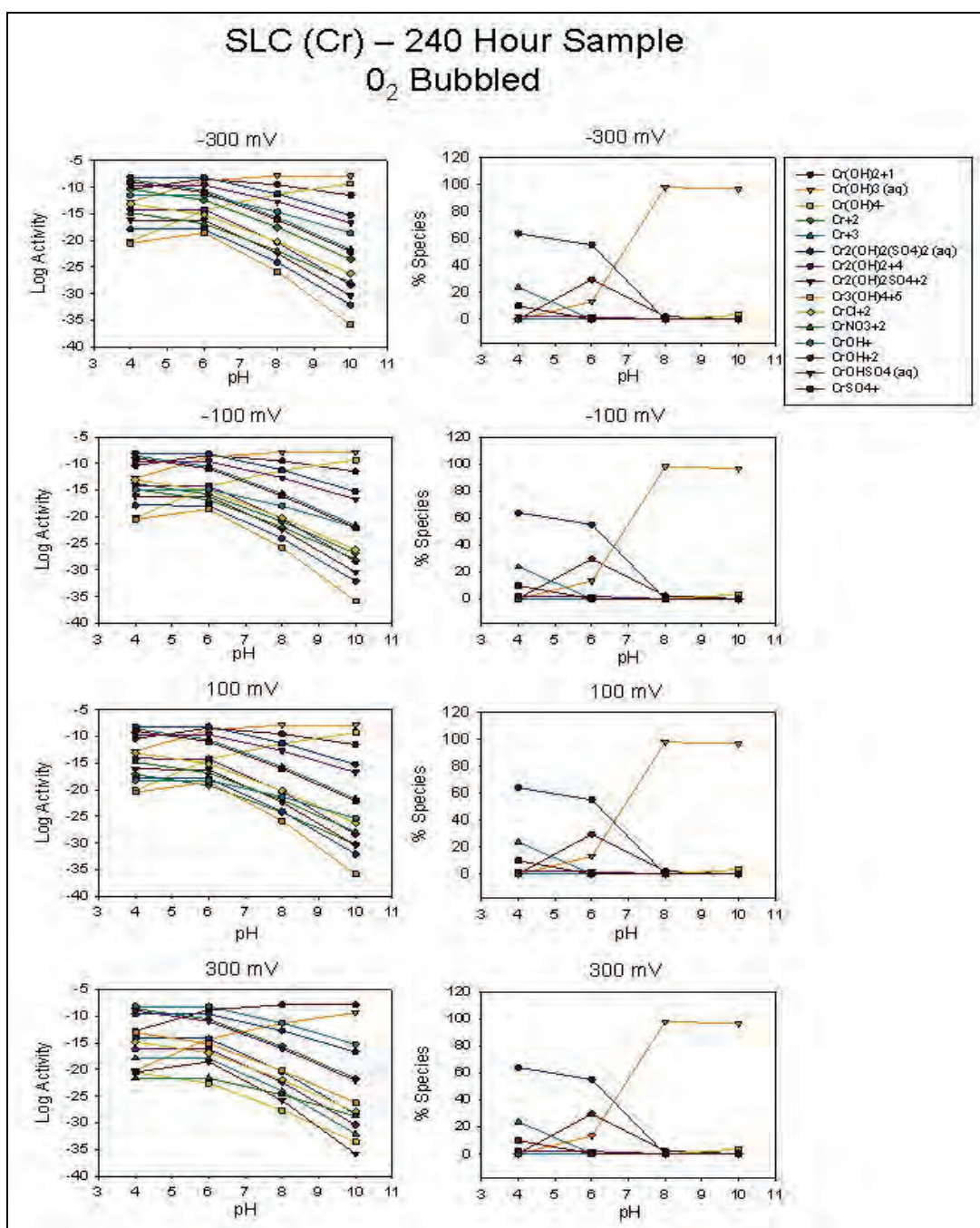


Figure 47. Results from geochemical modeling predicting chromium pairs and complexes in the sluice channel elutriate (t = 240 h), based on total Mn determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

Arsenic. Figures 48-51 show the geochemical speciation calculations for arsenic. Log activity plots show a wide variety of predicted arsenic pairs and complexes, based on the arsenite/arsenate redox couple. For the Emory River sediment, speciation calculations predicted the main arsenic species as As(V), in the forms of H_2AsO_4^- and HAsO_4^{2-} (pKa for these two species

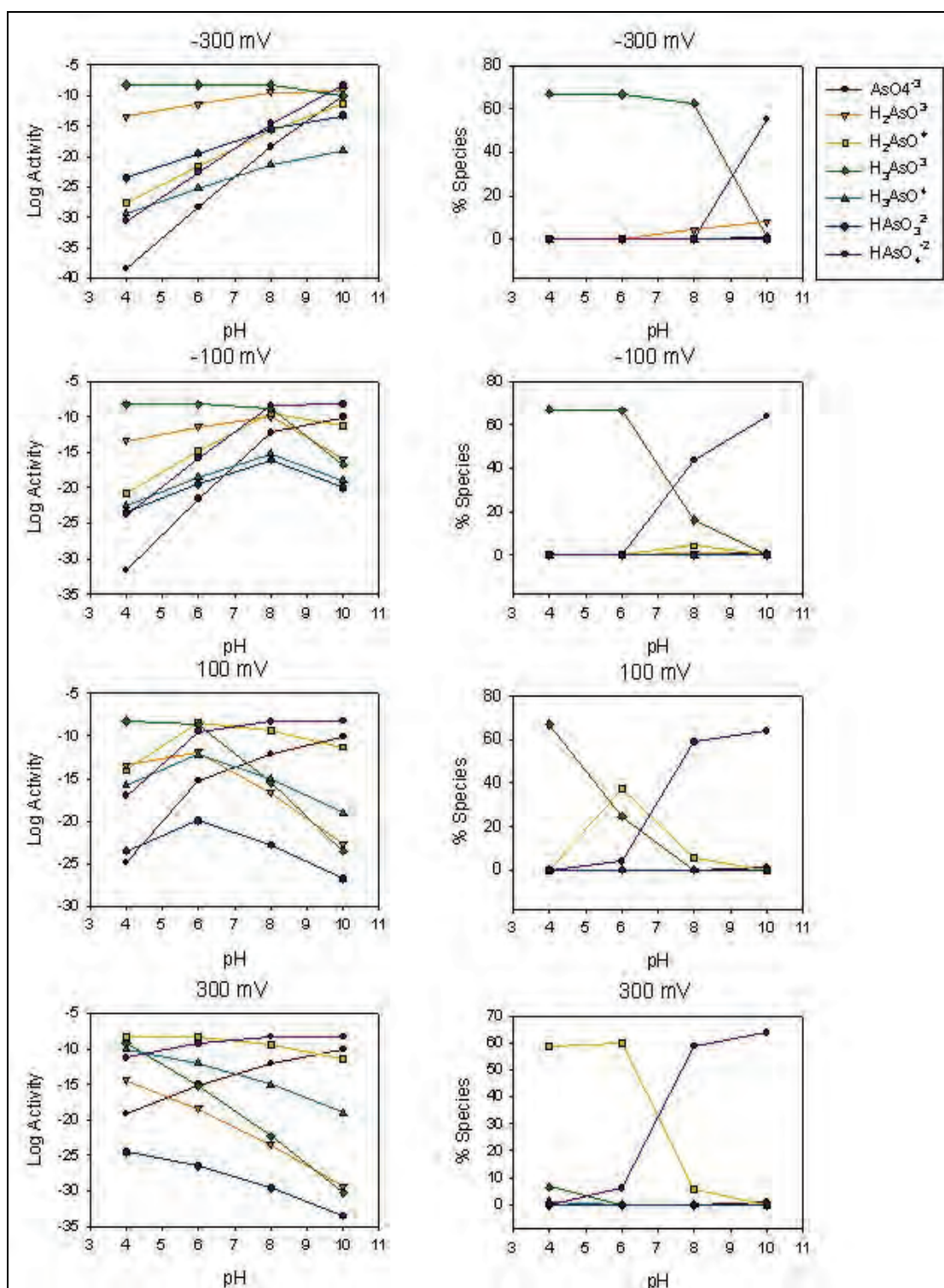


Figure 48. Results from geochemical modeling predicting arsenic pairs and complexes in the Emory River elutriate ($t = 0$ hr), based on total and speciated arsenic determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

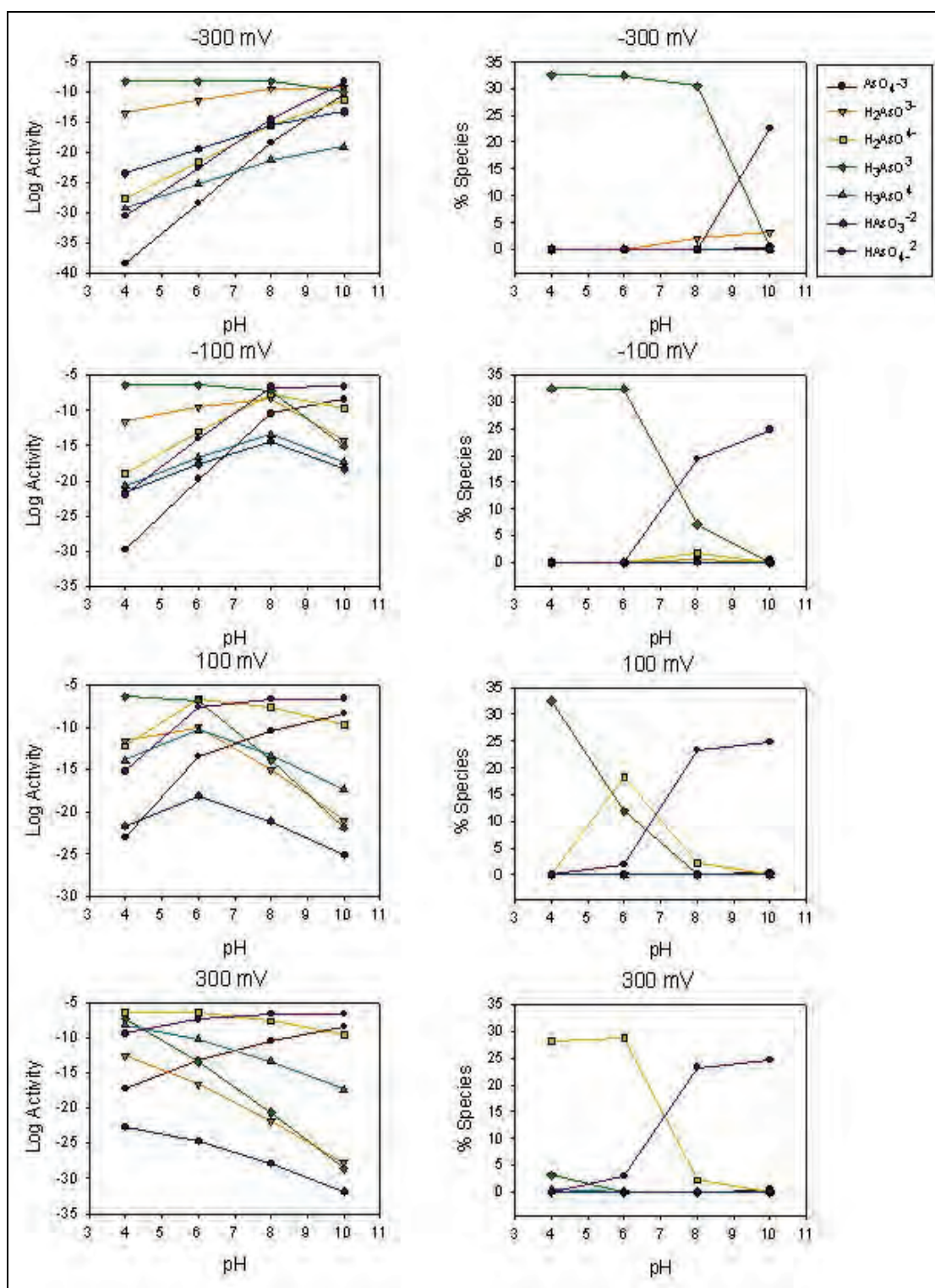


Figure 49. Results from geochemical modeling predicting arsenic pairs and complexes in the Emory River elutriate (t = 240 hr), based on total and speciated arsenic determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

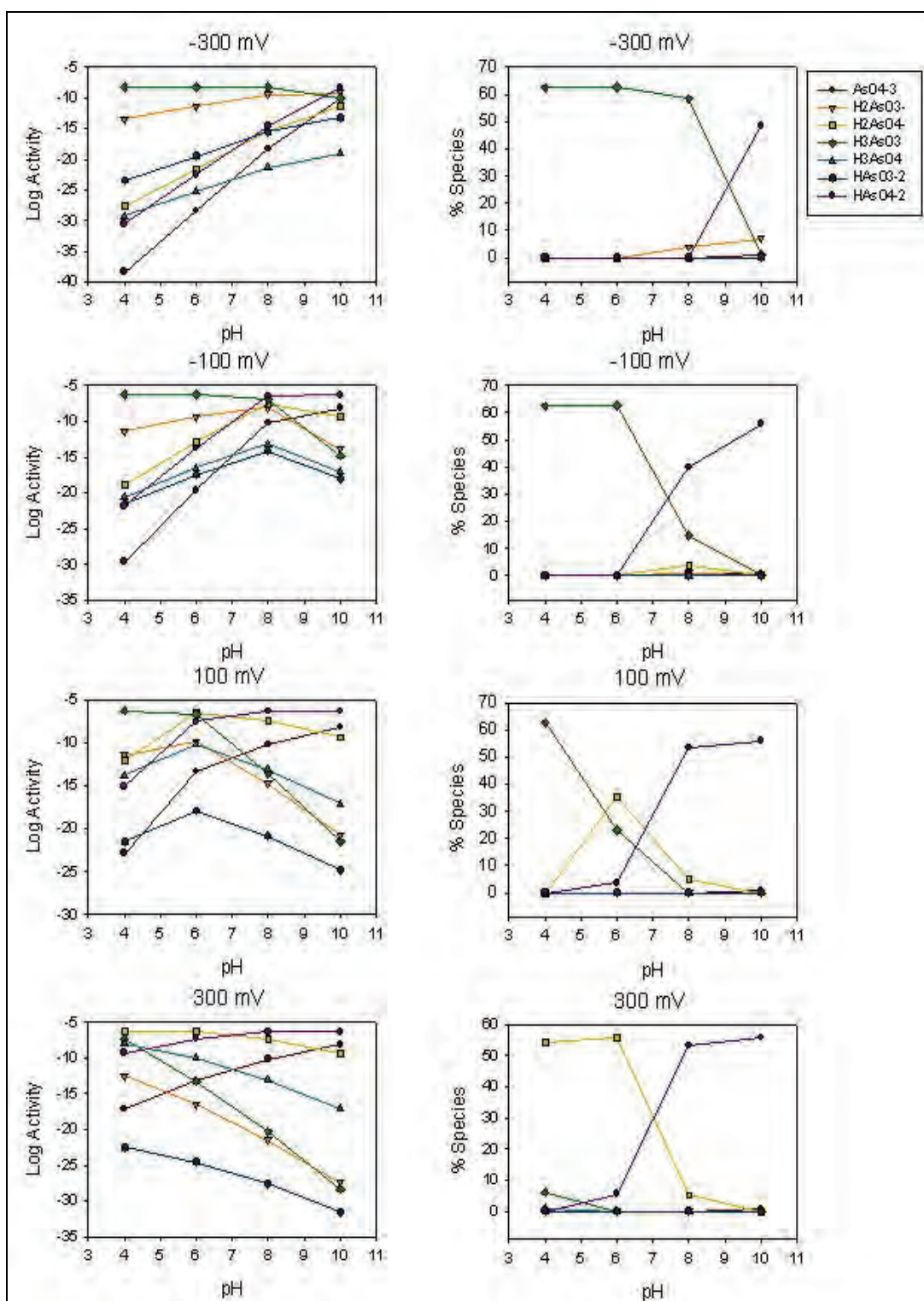


Figure 50. Results from geochemical modeling predicting arsenic pairs and complexes in the sluice channel elutriate ($t = 0$ hr), based on total and speciated arsenic determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

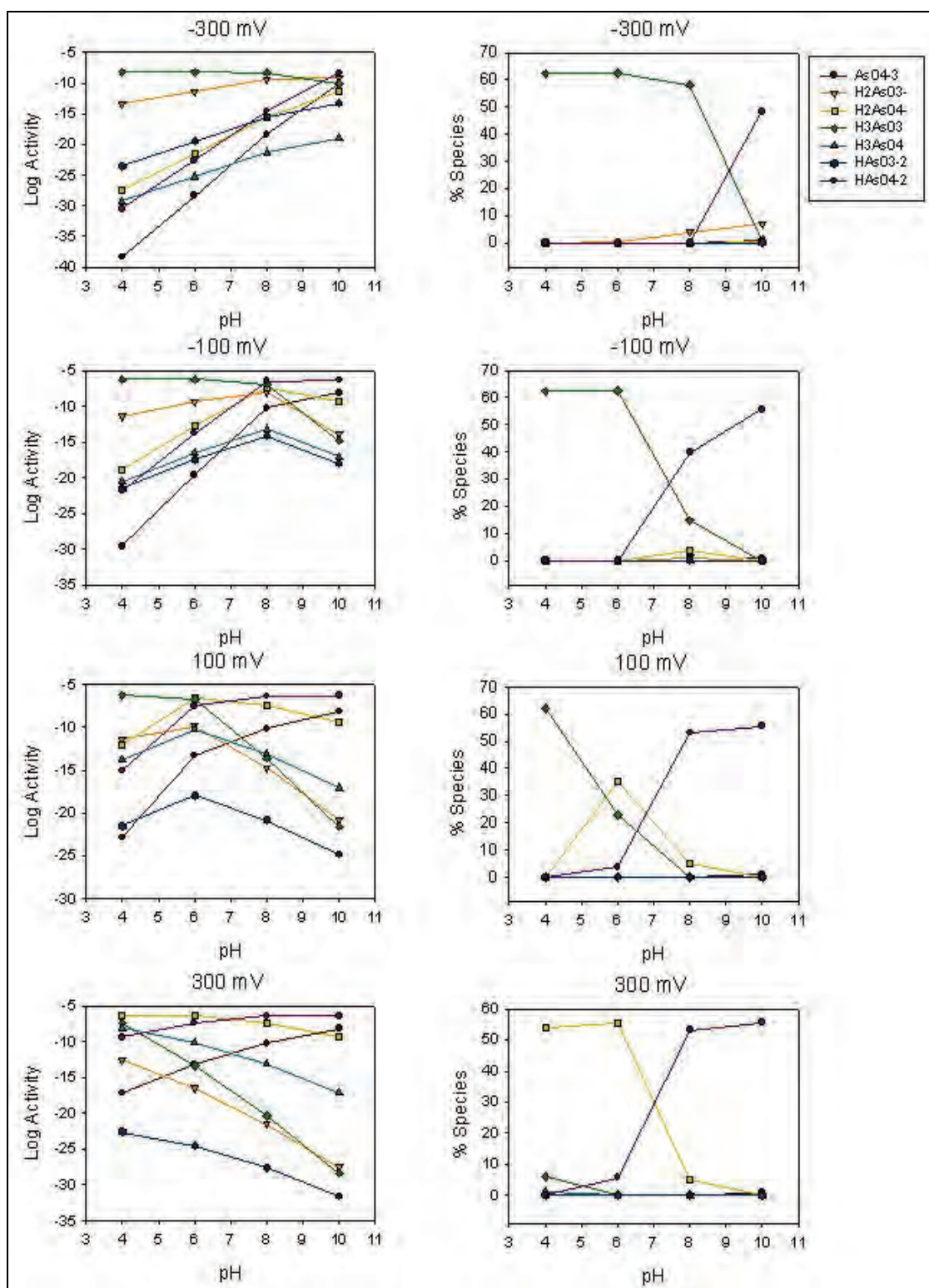


Figure 51. Results from geochemical modeling predicting arsenic pairs and complexes in the sluice channel elutriate (t = 240 hr), based on total and speciated arsenic determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

is 6.94). At $E_h = 300$ mV, As(V) represented the dominant species, with the percent distribution of the $H_2AsO_4^-$ and $HAsO_4^{2-}$ pairs well described by simple Henderson-Hasselbauch relationships. With decreasing E_h , the calculations predicted an increase in As(III) species, in the form of H_3AsO_3 (arsenious acid) and $H_2AsO_3^-$ ($pK_a = 9.2$). Thus, the predictions show that the thermodynamically favored arsenic species in the Emory River and sluice channel systems as As(V) – evidence supporting both the liquid and solid phase data.

Figure 49 shows the arsenic speciation calculations for the Emory River EET after 240 hr of oxic regime treatment. Thermodynamically, the $t = 0$ and 240 hr systems are very similar with respect to the arsenic pairs predicted. However, it was observed that the log activity values for the various arsenic pairs were shifted somewhat due to the higher level of barium in the elutriate system. Thus, the model predicted the precipitation of $BaHAsO_4 \cdot 2H_2O$ (Figure 55). Redox-associated shifts in $BaHAsO_4 \cdot 2H_2O$ are shown in Figure 55. In the SLC, $t = 0$ and 240-hr systems, the proportion of arsenic pairs is also predicted to be similar to Emory River sediments, except the higher concentration of sulfate is predicted to result in the precipitation of barite ($BaSO_4$) instead of $BaHAsO_4 \cdot 2H_2O$ (Figure 55).

Selenium. Se speciation calculations were not performed on the Emory River ($t = 0$ hr) elutriates as no Se was detected in solution. However, Se(IV) was detected in the oxic regime elutriates. Calculations predicted Se(IV) as the dominant species in this system, in the form of $HSeO_3^-$ and SeO_3^{2-} (Figure 52), even after assigning “excess” selenium concentration (total selenium – Se(IV)) to Se(VI). Similar predictions were obtained for the sluice channel systems (Figures 53 and 54). Predictions show that SeO_4^{2-} only emerges as a major selenium species under oxidation conditions ($E_h = 300$ mV) much higher than those generally observed in the Emory River or sluice channel.

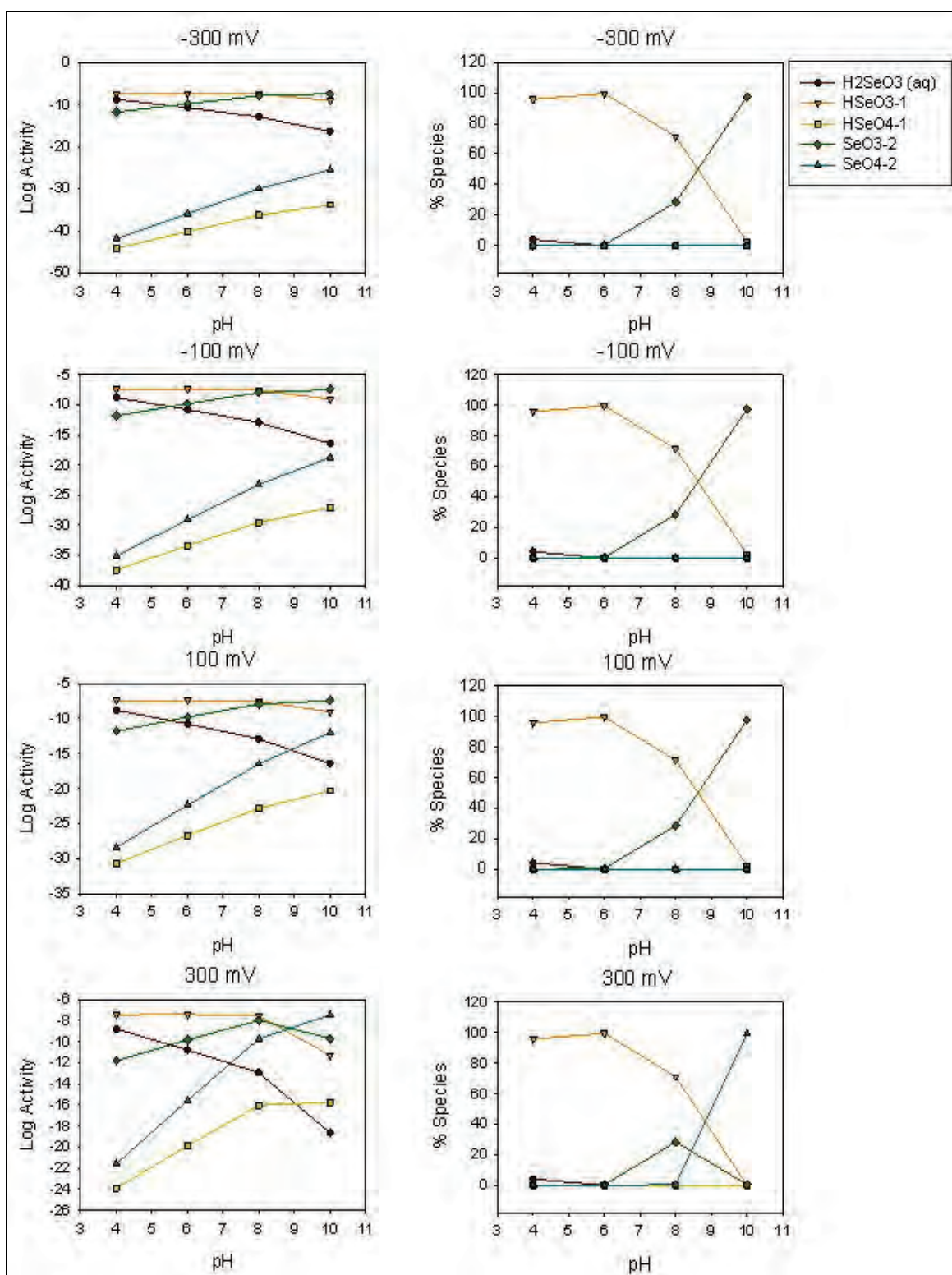


Figure 52. Results from geochemical modeling predicting selenium pairs and complexes in the Emory River elutriate (t = 240 hr), based on total and speciated Se determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

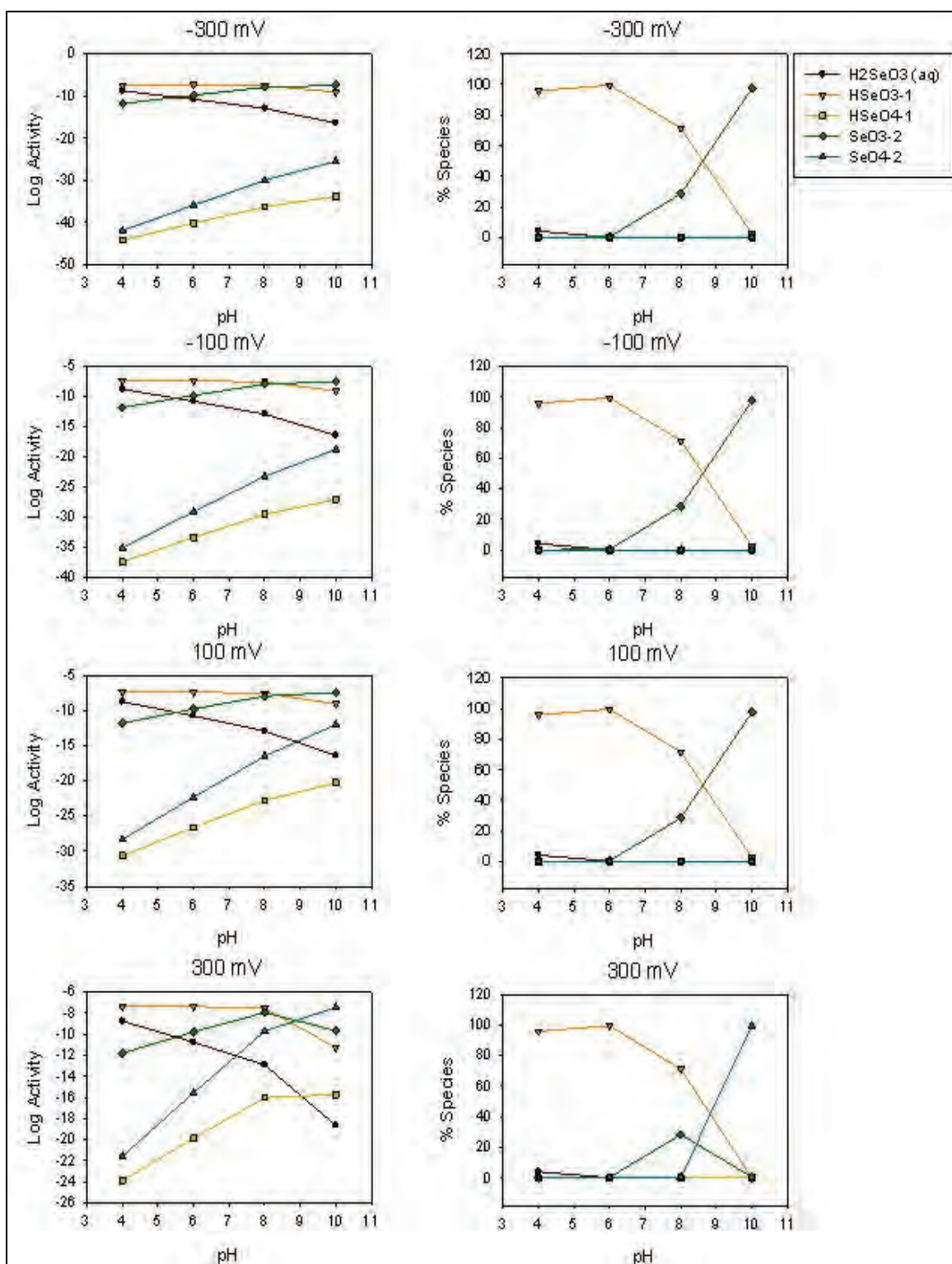


Figure 53. Results from geochemical modeling predicting selenium pairs and complexes in the sluice channel (t = 0 hr), based on total and speciated Se determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

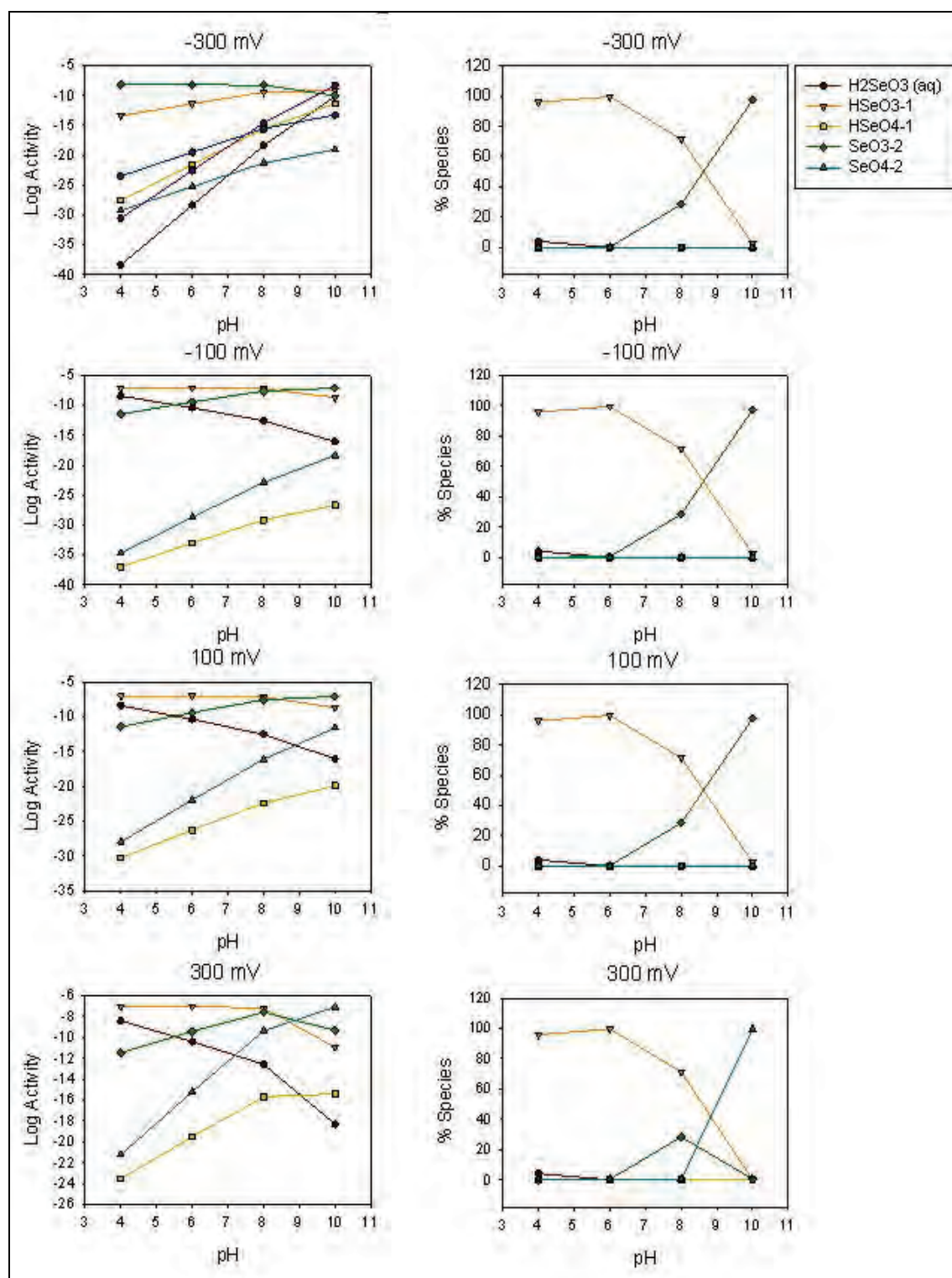


Figure 54. Results from geochemical modeling predicting selenium pairs and complexes in the sluice channel ($t = 240$ hr), based on total and speciated Se determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

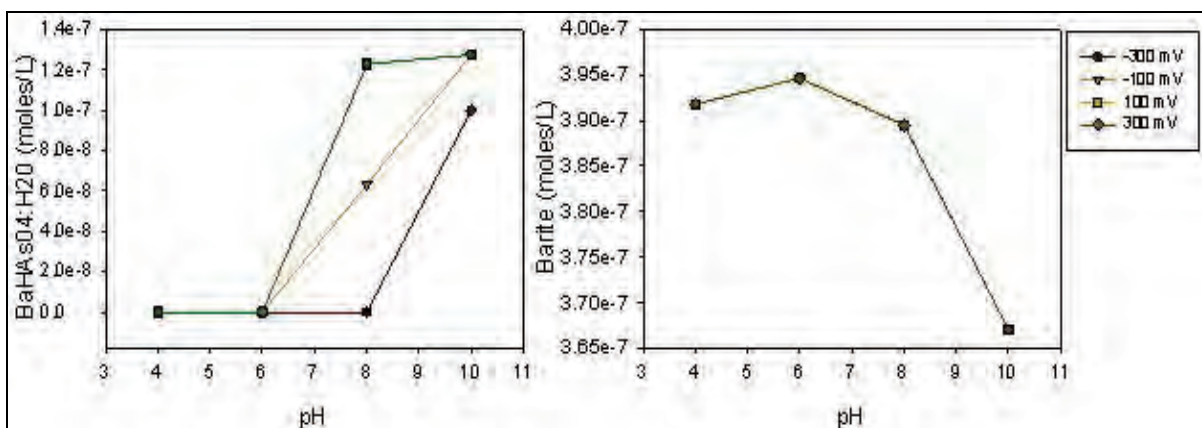


Figure 55. Results from geochemical modeling predicting precipitation of barium compounds (in mol/L) at $t = 0$ h in the (left) Emory River and (right) sluice channel elutriates. Predictions are based on total Ba and total and speciated As determined in solution. Calculations were performed for a pH sweep of 4 to 10, and redox sweep of -300 to +300 mV.

Conclusions:

- Increased dissolution of several elements (e.g., As, Ba, V, Se) was observed over the 10-day EET, while dissolved Mn concentrations decreased. Even though system redox remained relatively stable, fly ash Mn was demonstrated to partially oxidize by extensive oxic regime treatment. Iron phases were unaffected. The one order of magnitude increase in dissolved organic carbon over the EET suggests the experimental conditions promoted microbial activity.
- With the exception of Mn, bulk metal (loid) speciation remained relatively constant over the 10-day period. The major exception to this observation came from μ -XANES analysis showing a domain of selenate in Emory River elutriate solid after the 10-day oxic regime period, even though selenate was not detected in solution. It is unclear whether this domain was caused by the elutriate conditions or existed before the experiments were performed. However, the results do open up the possibility that extensive oxidation of the system can produce selenate. Geochemical modeling confirms that the Emory River conditions represent a lower boundary where selenate is thermodynamically stable in this system, although a relatively minor species relative to selenite.
- Given that both the anoxic and oxic regime (nitrogen- and air-bubbled) systems displayed nearly identical behavior, it is hypothesized that the trend in the dissolution of metals over the 10-day period was due to the extended agitation of the fly ash. The corresponding spike in microbial activities supports the view that constantly dispersing the fly ash enhances the microbial bioavailability to surface-adsorbed nutrients.

6 Bioassays

Methods

The potential for sediment elutriate effects was assessed by 10-day exposures of two different life stages of the fathead minnow *Pimephales promelas*. This fish is a recommended freshwater test species for elutriate exposures in USEPA and USACE guidance for testing dredged material (USEPA / U.S. Army Corps of Engineers (USACE) 1991, 1998). The *P. promelas* (Figure 56) is laboratory-cultured and was obtained from a commercial source (Aquatic Biosystems, Fort Collins, CO, USA). Larval fish were selected to assess the potential toxicity of a more sensitive life stage while juvenile fish were tested to gain information on whole body burdens and the potential for gill damage. The larval fish were exposed to



(a)



(b)

Figure 56. Images of (a) larval and (b) juvenile *Pimephales promelas*.

both elutriates (EMR-EL and SLC-EL), while the juvenile fish were exposed only to EMR-EL-AF. For all exposures, the oxic regime 10-day extended elutriate preparation described above was considered the 100% elutriate treatment. In addition, this elutriate was diluted with Emory River site water (river mile 12; RF1-WA) to prepare 50% and 10% elutriate treatments. Comparative treatments included the reference site water (RF1-WA, 0% treatment) and a performance control (dechlorinated tap water, Vicksburg, MS, USA, municipal source). Each treatment involved five experimental replicates and exposures were conducted at 20 ± 1 °C to represent conditions at the dredging site.

To maintain water quality during the exposures, water exchanges (90% of total volume) using freshly diluted treatments (control, 0, 10, 50, 100%) were conducted on test days three and seven. Daily water exchanges were not practical due to 1) the amount of water that would be required for both bioassays (> 800 L), and 2) the settling of the solid phase particles in the larval bioassay that necessitated transfer of larvae to new exposure chambers at each water renewal to avoid temporally increasing test concentrations. Prior to preparation of test concentrations, the stored 100% elutriates were thoroughly homogenized by mechanical mixers (Lightnin DuraMix, E78R2558N-RR, Mixing Equipment Inc., Avon, NY, USA for EMR-EL and IKA, Model RW 20 DS1, Wilmington, NC, USA for SLC-EL) for 5 minutes and elutriate consistency at each renewal was confirmed by total suspended solids (TSS) measurements (conducted according to American Public Health Association (APHA) 1999). During testing, larval and juvenile *P. promelas* received feeding rations of *Artemia* nauplii and fish flakes (Zeigler® AquaTox Feed, Aquatic Eco-Systems, Inc., Apopka, FL, USA), respectively. In compensation for the forgoing daily water renewals, this ration was supplied every other day to maintain water quality. This procedure is in basic accordance with the 96-hr *P. promelas* test method in USEPA/USACE (1998). Survival was assessed daily and deceased individuals were removed promptly.

Water quality parameters (temperature, pH, conductivity, dissolved oxygen) were recorded for all replicates at test initiation and termination and for one replicate per treatment during test days 1-9. Ammonia was measured in one replicate per treatment over the duration of the exposure and alkalinity and hardness were measured at test initiation. A model 315i meter (WTW; Weilheim, Germany) was used for pH and temperature, a model Oxi 330 meter (WTW; Weilheim, Germany) was used for D.O. and

an ECTestr low instrument (Oakton Instruments, Vernon Hills, IL, USA) was used for conductivity. Meters were calibrated daily and slopes were logged (Appendix F). Ammonia (Model PAN Code 4795), alkalinity (Model WAT-DR Code 4491) and hardness (Model PHT-DR-L1 Code 4482) were measured using LeMotte (Chestertown, MD, USA) titration kits.

Larval fish elutriate bioassay

Fish larvae were obtained and held for 72 hr to allow acclimation to laboratory conditions. During each day of acclimation, a feeding ration of *Artemia nauplii* was supplied and water quality was monitored and recorded (Appendix F). The age of the larval fish at test initiation was 9 days post-hatching. This age was selected to be more sensitive than the juvenile life stage but more tolerant to the reported confounding factors inherent to the site (i.e., fungal infections) and to a low feeding ration. Tests were conducted in general accordance with guidance (USEPA/USACE 1998; USEPA 2002a, 2002b). Each of the five experimental replicates per treatment received 10 larvae. Each replicate was gently aerated from an oil-free source (trickle flow, 2-5 bubbles per second) to provide some turbulent flow and to maintain dissolved oxygen levels. More rigorous aeration was not implemented (to attempt to keep the solid phase material in suspension) to avoid energetic stress to the larval fish. At test termination, the endpoints assessed were survival, biomass, and abnormalities. Additionally, a reference toxicity test using KCl (positive control) was conducted to assess the larval fish health relative to historic control charts. Additional details on the general conduct of the bioassays are provided in Table 14. The exposure system is shown in Figure 57 (a).

Juvenile fish elutriate bioassay

Juvenile fish were also obtained and held for 72 hr to allow acclimation to laboratory conditions. The acclimating fish received a daily feeding ration of AquaTox fish flakes and water quality parameters were recorded daily (Appendix F). Juvenile fish (4.2 ± 0.3 cm) were selected to supply adequate tissue mass for chemical analysis and gill histopathology. Larger adult fish were not used since they may reduce the water quality within the test chambers more rapidly. While a specific testing protocol was not available for this juvenile fish exposure, it was conducted in general accordance with bioassay guidance (USACE/USEPA 1998; USEPA 2002a, 2002b). Each of the five experimental replicates per treatment received

Table 14. Summary of conditions for fly ash elutriate toxicity tests conducted by ERDC.

Description	Larval <i>Pimephales promelas</i>	Juvenile <i>Pimephales promelas</i>
Test type	Static renewal on days 3 and 7	Static renewal on days 3 and 7
Test duration	240 hr	240 hours
Temperature	Mean: 20.0 ± 1.0 °C Instantaneous: 20.0 ± 3.0 °C	Mean: 20.0 ± 1.0 °C Instantaneous: 20.0 ± 3.0 °C
Salinity / conductivity	Site specific	Site specific
pH	7-9 SU	7-9 SU
Light quality	Ambient laboratory	Ambient laboratory
Light intensity	10-20 uE/m ² /s	10-20 uE/m ² /s
Photoperiod	16L:8D	16L:8D
Test chamber size	300-ml beakers	4 L aquarium
Test solution volume	200 mL	3.5 L
Renewal of overlying water	90% renewal on Days 3 and 7	90% renewal on Days 3 and 7
Age / size of test organisms	Approximately 9 days old, 24-hr range	3-5 cm
No. organisms per chamber	10	5
No. replicates	5	5
No. organisms per concentration	50	25
Feeding regime	0.2 ml concentrate of <i>Artemia nauplii</i> every other day	Fish flakes <i>ad libitum</i> every other day
Test chamber cleaning	Settled elutriate rinsed away at water exchanges	Settled elutriate rinsed away at water exchanges
Test solution aeration	Trickle flow, 3-5 bubbles per second	Moderate to heavy
Dilution water	Site water	Site water
Test concentrations	Three dilutions of elutriate, reference, and control (lab) water	Three dilutions of elutriate, reference, and control (lab) water
Dilution series	100%, 50%, 10%, 0%	100%, 50%, 10%, 0%
Endpoint	Survival, growth, abnormalities	Survival, organ mass, abnormalities, histology, tissue residues
Sampling and hold time	< 8 weeks for sediment ASAP following elutriate preparation	< 8 weeks for sediment ASAP following elutriate preparation
Sample volume required	7.2 L per site minimum	126 L per site minimum
Test acceptability criterion	At least 80% survival in the negative control	At least 80% survival in the negative control



(a)



(b)

Figure 57. Image of exposure systems for (a) larval and (b) juvenile *Pimephales promelas*.

five juvenile fish and was rigorously aerated from an oil-free source to represent turbulent lotic conditions, and to provide adequate agitation to keep the solid phase material suspended and maintain dissolved oxygen levels. This was in contrast with the larval exposure and was implemented in this case to assess extreme effects of the solid phase material on the gills. The exposure system is shown in Figure 57 (b).

At test termination, the endpoints assessed were survival, whole fish biomass, liver mass (to determine a liver to body mass index), gill histopathology, and abnormalities. At termination, all fish were blotted dry and three of the five fish per replicate were immediately frozen for analysis of chemical residues in whole fish residues. These fish were later composited and homogenized into a fine powder using a mortar and pestle over a liquid nitrogen bath and then submitted for chemical analysis.

Fish homogenates were digested by a modified USEPA method 3050B, explicitly, using additional hydrogen peroxide as needed to destroy lipids that may interfere with ICP-MS elemental analysis. The digestates were filtered and diluted as described above with the fly ash and reference sediment materials. Due to the generally low levels of metals present in tissue, ICP-AES was not used for analysis. Mercury was determined by cold vapor atomic fluorescence using a PS Analytical atomic fluorescence instrument following USEPA method 7474 (USEPA 2007).

Dissections were conducted at ERDC on the remaining two fish per replicate immediately following test termination. Fish were anesthetized (Tricaine methanesulfonate, TMS, MS-222) and livers and gills were carefully removed using Fisherbrand micro-dissection scissors (08-953-1B, Thermo Fisher Scientific, Waltham, MD, USA) assisted by dissecting microscopes. Gills were imaged (Figure 58) and immediately placed into 10-ml Bouin's Solution (Sigma Chemical, HT10132-1L, Saint Louis, MO, USA) contained in 20-ml glass scintillation vials. Specimens were shipped overnight to the Department Pharmacology at the University of Mississippi (Oxford, MS, USA) for gill histopathology.

Statistical analysis

All statistical comparisons were conducted using SigmaStat software (SPSS, Chicago, IL). Data normality and homogeneity were assessed by the Kolmogorov-Smirnov and Levene's Tests, respectively. All survival data were arc-sine transformed. A one-way ANOVA was conducted to assess



Figure 58. Gills dissected from an unexposed juvenile *Pimephales promelas*.

statistical significance between treatment levels ($\alpha = 0.05$), and individual differences were elucidated using Dunnett's test. When necessary, data were transformed (square root, \log_{10}) to accommodate the assumptions of normality. When data distributions did not allow parametric statistics, the Kruskal-Wallis ANOVA on ranks was applied. Statistical significance of endpoints for the various treatment levels (10, 50, 100%) was compared relative to the RF1-WA site water (0% treatment). A paired t-test (0% vs. treatment) was used to determine the individual p-values. Tissue residues of juvenile fish were compared by one-way ANOVA and the Dunnett's method as described above.

Results

The survival in both life stages of *P. promelas* in the negative control met acceptability criteria (4-day larval survival = 100%, 10-day larval survival = 86%, 10-day juvenile survival = 100%) as defined in Table 14. Additionally, all water parameters measured during the exposures (Appendix F) were within the ranges specified by test guidance. The 48-hr and 96-hr LC50 values for larvae exposed to KCl (positive control) were both 0.69 (0.60 – 0.80) g KCl/L (Appendix G), which falls within the

required two standard deviations from the mean LC50 derived from control charts (0.61 – 1.13 g/L). The TSS levels were determined to be comparable for the resuspended 100% treatment and freshly diluted 50 and 10% treatments on each of the water renewal days (Table 15).

Table 15. Confirmation of elutriate homogenization consistency by total suspended solids (TSS) concentrations prior to water renewals (days 0, 3, and 7). NA = data not available, sample not taken.

Site ID	Concentration	Mean total suspended solids (mg/L)		
		Day 0	Day 3	Day 7
EMR-EL	10%	36.92 ± 10.63	51.5 ± 15.2	50.00 ± 2.38
	50%	185.33 ± 16.63	215.5 ± 33.81	270.08 ± 18.00
	100%	500.42 ± 32.17	453.08 ± 48.57	527.58 ± 17.32
SLC-EL	10%	45.08 ± 14.68	46.50 ± 2.84	46.17 ± 39.81
	50%	NA	157.58 ± 12.13	213.83 ± 31.04
	100%	435.17 ± 12.79	461.92 ± 425.07	468.75 ± 14.34

Larval elutriate bioassay

In the larval fish exposure, daily survival counts were estimated in the 50 and 100% treatments due to the opaque nature of the media and settled solid phase material. However, survival counts were fully assessed on water exchange days (days 3 and 7) and at test termination (day 10). Normal feeding behavior was observed during the exposure. While some spinal curvature was observed in individual fish (denoted by asterisks in the raw data sheets, Appendix F), these abnormalities were not observed monotonically. Fungal growths were not noted. Relative to the site water treatment (0%), there were no significant decreases in 4-day or 10-day larval survival (Table 16). However, 10-day survival was significantly greater in the EMR-EL-LF-100% treatment relative to site water (0% treatment). While slight decreases in survival were observed for the two highest SLC treatments (SLC-EL-LF-100% and 50%) as the exposure approached 10 days (Figure 59(a)), they were not statistically significant. This trend was not observed in the EMR-EL-LF treatments. Overall, larval growth did not occur relative to the initial weights of the fish, potentially due to the reduced feeding ration (once every other day vs. twice daily), which was employed to maintain water quality with fewer water exchanges. The reduced feeding ration was a deviation from the standard bioassay method. Data are consequently reported as biomass. Only one

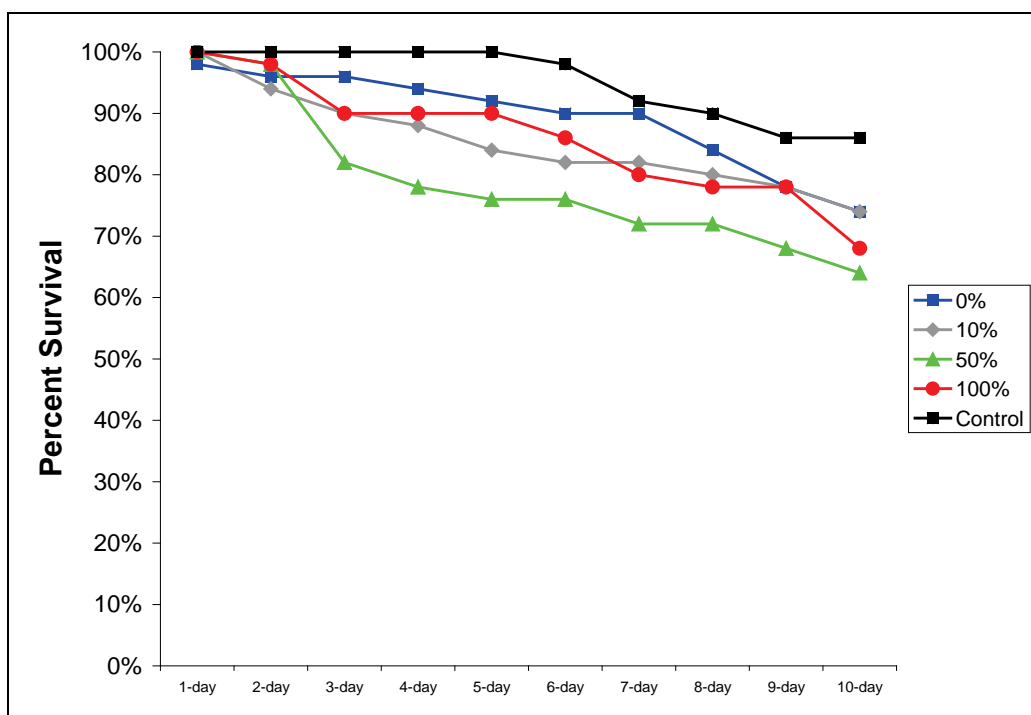
statistically significant decrease in 10-day biomass relative to the site water was observed for EMR-EL-LF-10%. However, significant reductions were not observed in the higher treatments (EMR-EL-LF-100% and 50%).

Table 16. Summary of larval *Pimephales promelas* survival and biomass after 10 days of exposure. All statistical comparisons were to the site water (0%). Asterisks indicate a statistically significant decrease in the endpoint while number signs indicate a statistically significant increase in the endpoint. Individual p values were obtained through paired t-tests in comparison to the site water (0%). One-way ANOVA and paired tests provided equivalent results. NA = data not available.

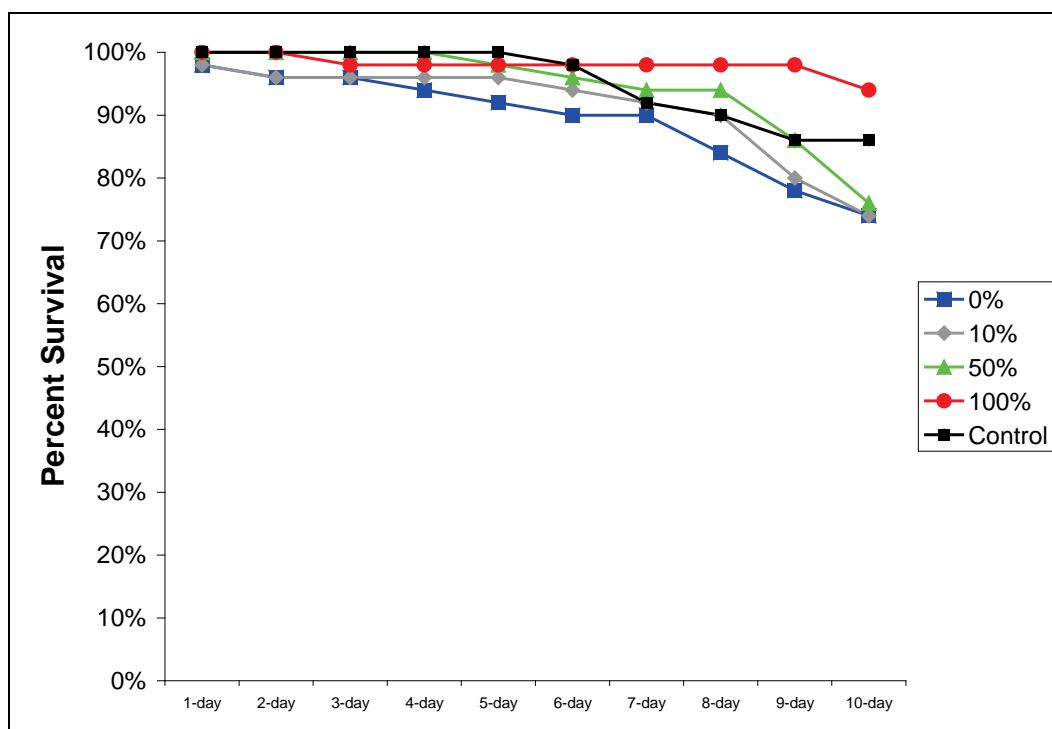
Site ID	Concentration	4-day Survival		10-day Survival		10-day Individual Fish Biomass	
		Mean (%)	P value	Mean (%)	P value	Mean (mg)	P value
EMR-EL-LF	Control	100 ± 0	NA	86 ± 5	NA	0.20 ± 0.01	NA
	0%	94 ± 5	NA	74 ± 15	NA	0.24 ± 0.05	NA
	10%	96 ± 5	0.690	74 ± 15	0.800	0.18 ± 0.02*	0.043
	50%	100 ± 0	0.151	76 ± 19	0.667	0.20 ± 0.02	0.810
	100%	98 ± 4	0.242	94 ± 5 #	0.017	0.20 ± 0.01	0.092
SLC-EL-LF	Control	100 ± 0	NA	86 ± 5	NA	0.20 ± 0.01	NA
	0%	94 ± 5	NA	74 ± 15	NA	0.24 ± 0.05	NA
	10%	88 ± 4	0.098	74 ± 11	0.976	0.21 ± 0.03	0.229
	50%	78 ± 28	0.244	64 ± 31	0.690	0.20 ± 0.08	0.306
	100%	90 ± 12	0.714	68 ± 13	0.487	0.21 ± 0.04	0.302

Juvenile elutriate bioassay

No mortality or abnormality was observed during the 10-day exposure of juvenile fish. Fish length ($p = 0.194$), whole fish biomass ($p = 0.188$), liver mass ($p = 0.506$), and the liver somatic index ($p = 0.789$) were not significantly different between treatments relative to the site water (0% treatment) (Table 17). The combination of the rigorous aeration and the current created by fish swimming kept the solid phase material in suspension (see photographs in Figure 57). The juvenile fish could not be quantified in the 50 and 100% treatments during non-water exchange days due to the opaque nature of the suspension. Normal feeding behavior was observed in all treatments throughout the exposure.



(a)



(b)

Figure 59. Daily survival of larval *Pimephales promelas* assessed over the 10-day exposure duration for (a) SLC-EL-LF, and (b) EMR-EL-LF. Estimates of the data distribution were omitted for clarity but are available in Tables 14 and 15.

Table 17. Summary of mean juvenile *Pimephales promelas* survival and biomass (and one standard deviation from the mean) after 10 days of exposure to EMR-EL-AF. Numbers in parentheses represent the coefficient of variation. NA = data not available.

Concentration	Percent Survival	Length (cm)	Biomass (mg)	Liver mass (mg)	Liver Somatic Index
Control	100 ± 0	NA	NA	NA	NA
0%	100 ± 0	4.2 ± 0.3 (7%)	888 ± 188 (21%)	16.83 ± 4.64 (28%)	1.9 ± 0.6 (30%)
10%	100 ± 0	4.0 ± 0.4 (10%)	796 ± 173 (22%)	16.04 ± 4.63 (29%)	2.0 ± 0.3 (16%)
50%	100 ± 0	4.3 ± 0.2 (5%)	959 ± 138 (14%)	18.46 ± 5.06 (27%)	1.9 ± 0.5 (24%)
100%	100 ± 0	4.2 ± 0.3 (6%)	943 ± 167 (18%)	20.04 ± 8.09 (40%)	2.2 ± 0.8 (37%)

Whole juvenile fish body burdens

Analysis of the whole bodies of the juvenile *Pimephales promelas* revealed a dose-dependent response in the mean concentrations of the six metals of interest (Table 18). The increases in As, Ba, Se, and V were significantly greater in all EMR-EL-AF treatments (10%, 50%, 100%) relative to fish exposed to the Emory River reference water (0%). For Hg, the two highest treatments (50%, 100%) showed significantly higher concentrations in the fish. While Cr did increase monotonically, no statistical significance was found in body burdens relative to the 0% treatment. Significant increases in whole body burdens were observed for an additional 11 metals, 10 of which showed monotonic increases (Al, Cd, Co, Cu, Fe, K, Mg, Mo, Pb, Tl). While metals were detected in the AquaTox fish food that was provided every 48 hr (As: 1.7, Ba: 3.17, Cr: 5.5, Hg: 0.002, Se: 1.3, V: 0.36 mg/kg), the feeding ration was kept equal in all exposure chambers. Thus, the consistent and statistically significant dose-dependent relationship in the whole body burdens of the fish suggests that the source of the metal burdens in fish was the test material. However, provided that this assessment was a whole fish analysis in an exposure to metal-laden particles in suspension, the measured concentrations include the sum of metals accumulated in tissues and material that resided in the gut.

In order to assess the portion of metals in tissue measured during the juvenile *P. promelas* 10-day bioassay that were attributable to metal associated with ingested particles present in the gut, an additional 10-day juvenile *P. promelas* study was conducted. Determining what fraction of

metals present in the gut vs. the fraction present in the rest of the body is important in that a significant portion of the metals in the gut may be passed out of the body and may not be bioavailable to the fish (Vijver et al. 2004).

Table 18. Whole *Pimephales promelas* body burdens (mg/kg wet weight) for arsenic (As), barium (Ba), chromium (Cr), mercury (Hg), and vanadium (V) and other metals (below the double line). Selenium is reported as a dry weight using an internally derived 0.238 conversion factor to compare to a USEPA (2004) tissue benchmark value. Asterisks denote a significant increase relative to tissue concentrations measured in the 0% (Emory River Reference) treatment. The detection limit was 0.10 mg/kg (detection limit for mercury was 0.005 mg/kg).

Metal	Control	0%	10%	50%	100%
As	0.12 ± 0.02	0.37 ± 0.04	1.21 ± 0.22 *	2.95 ± 0.76 *	2.84 ± 0.99 *
Ba	1.83 ± 0.17	2.40 ± 0.52	8.20 ± 1.82 *	18.54 ± 4.99 *	20.24 ± 7.90 *
Cr	1.86 ± 1.12	3.53 ± 3.20	5.50 ± 3.00	5.45 ± 2.14	8.12 ± 5.13
Hg	0.015 ± 0.001	0.017 ± 0.003	0.017 ± 0.002	0.023 ± 0.004 *	0.023 ± 0.005 *
Se	1.02 ± 0.06	1.12 ± 0.12	1.46 ± 0.11 *	2.14 ± 0.21 *	2.45 ± 0.42 *
V	0.06 ± 0.03	0.10 ± 0.05	1.54 ± 0.40 *	4.06 ± 0.93 *	3.88 ± 1.28 *
Ag	< 0.10	0.17 ± 0.27	< 0.10	< 0.10	0.13 ± 0.18
Al	11.10 ± 3.58	25.56 ± 9.06	400 ± 112.17 *	955.80 ± 253.59 *	942.20 ± 352.93 *
Be	< 0.10	< 0.10	< 0.10	0.16 ± 0.04	0.16 ± 0.04
Ca	5810 ± 141	5544 ± 850	5766 ± 435	5566 ± 380	5106 ± 514
Cd	< 0.10	< 0.10	0.13 ± 0.01 *	0.37 ± 0.07 *	0.39 ± 0.09 *
Co	< 0.10	< 0.10	0.37 ± 0.07 *	0.81 ± 0.19 *	0.83 ± 0.30 *
Cu	1.07 ± 0.14	1.30 ± 0.29	2.24 ± 0.37 *	4.09 ± 0.89 *	4.07 ± 1.03 *
Fe	35.42 ± 3.09	71.10 ± 24.41 *	248.60 ± 51.26 *	517.60 ± 127.75 *	497.00 ± 175.74 *
K	2202 ± 141	2304 ± 48	2374 ± 156	2498 ± 170	2586 ± 159 *
Mg	260 ± 16	266 ± 19	293 ± 16	338 ± 29 *	344 ± 36 *
Mn	1.20 ± 0.27	3.41 ± 1.25	3.41 ± 0.51	5.62 ± 1.33 *	5.22 ± 1.72
Mo	< 0.10	< 0.10	0.26 ± 0.19 *	0.28 ± 0.05 *	0.31 ± 0.12 *
Na	931 ± 56	917 ± 48	945 ± 47	972 ± 24	994 ± 57
Ni	0.86 ± 0.57	1.71 ± 1.46	3.07 ± 1.15	3.83 ± 0.84	5.08 ± 2.78
Pb	0.21 ± 0.10 *	0.36 ± 0.20 *	0.81 ± 0.30 *	1.47 ± 0.41 *	1.57 ± 0.56 *
Sb	0.20 ± 0.34	< 0.10	0.15 ± 0.22	< 0.10	0.45 ± 0.36
Tl	< 0.10	< 0.10	< 0.10	0.15 ± 0.03	0.21 ± 0.04 *
Zn	24.94 ± 2.04	27.98 ± 3.42	27.12 ± 1.08	27.82 ± 3.87	26.96 ± 3.87
¹ Expressed as dry weight.					

Treatments in this study included EMR-WA, EMR-EL, and a dechlorinated tap water control. This bioassay was performed using the same methods as the original 10-day bioassay, except that in the second study, each treatment consisted of one exposure chamber with five fish in each, and water was renewed once on day 5.

At the end of the 10-day exposure, there was 100% survival in each treatment. Fish were sacrificed using MS-222, and their digestive tracts were removed (the liver was not removed). The remainder of the fish carcass was homogenized into a fine powder using a mortar and pestle over a liquid nitrogen bath. The digestive tracts were dried overnight in a 60 °C oven, then ashed in a muffle furnace at 550 °C for 3 hr. Metal content in the ashed digestive tracts and the homogenized fish carcasses was then submitted for analytical determination using the same methods described for the original 10-day bioassay.

For all of the treatments described above, the total concentration of As, Ba, Cr, Se, and V were much higher in the gut removed from the fish than from the whole fish with the gut removed. Mercury was not analyzed in the gut due to low mass of the recovered material. However, dissolved concentrations of Hg were not detected in the extended elutriate at the 10th day of preparation. This effect was most dramatic when fish were exposed to fly ash in the elutriate preparation from the Emory River where concentrations in the gut were 50 to 2800 times higher than in the whole fish with the gut removed. This evidence would suggest the exposure-dependent elevations in metal concentration in fish is more likely from gut contents than actual available fraction of metals in fish tissue. Further analysis of these data by normalization of metal concentration to aluminum concentration in fish (an indication of sediment present in gut) showed significant correlations ($p < 0.05$) between aluminum concentration and levels of As, Ba, Hg, Se, and V in fish tissue. As a predominant element in the fly ash particles, aluminum concentrations can be considered a tracer for the particles that resided in the gut.

Discussion

Elutriate bioassay results may be interpreted through a weight of evidence (WOE) evaluation that considers multiple lines of evidence (e.g., chemistry, toxicity, accumulation) to assess the potential for the suspended fly ash to adversely affect aquatic life. A weight of evidence approach provides a more comprehensive evaluation using all available

data in contrast to reliance on a single measurement endpoint (Adams et al. 2004). In this assessment, elutriate bioassay results are complemented by additional lines of evidence including dissolved water concentration in oxidized elutriate and tissue residues in fish from the elutriate bioassay. This section describes the interpretation of water and tissue residue chemistry results as compared to appropriate screening and literature values. Box and whisker plots were used to show the median, 25th and 75th percentiles, and 10th and 90th percentiles where adequate data were available.

To evaluate the most extreme scenario for exposure of fish to metals in the elutriate preparation, the highest dissolved concentration of each metal during the 10-day elutriate preparation was used. Most often this was the 10-day value (exception: Hg). The Criterion Continuous Concentration (CCC) from the USEPA was selected as the preferred screening value protective of aquatic life. State water quality standards are not shown in these comparisons because the state values are the same as USEPA values. Generally, chemical concentrations were not compared against human health screening values because this is outside the scope of this study and not relevant to the other measures of fish toxicity and metal concentrations in whole fish. However, an MCL for Ba in drinking water was discussed in the text below for comparative purposes since USEPA water quality criteria were unavailable. In addition to the screening values, literature values were used for the comparison. A search of all relevant peer-reviewed publications was conducted using the U.S. Environmental Protection Agency's ECOTOX Database (<http://cfpub.epa.gov/ecotox/>) and Science Direct (<http://www.sciencedirect.com/>).

Metal concentrations in whole fish were evaluated through interpretation of tissue residue values (TRVs). While metal TRVs are generally poor estimators of an effect, they can be useful in a weight of evidence assessment to determine the role of a metal in potential toxicity. Some metals, such as selenium, are best evaluated through the use of tissue-based TRVs. Relevant TRVs and literature-effect concentrations (e.g., lowest observed effect residues and no observed effect residues) for whole fish were obtained through literature searches and the USACE Environmental Residue Effects Database (ERED; <http://el.erdcl.usace.army.mil/ered/>). This assessment was considered conservative as tissue TRVs were compared to the whole body burdens of metals in the fish exposed in this study that included metal-laden particles associated with the gut contents.

Relevant literature studies used to compare water and tissue concentrations were screened following methods described by Steevens et al. (2005). Where relevant screening criteria were not available, literature values were sought to relate metal concentrations in water and tissues to effects observed in elutriate toxicity bioassays. Because there is a wide variety of laboratory and field-based studies reporting toxicity of metals, the available literature must be screened to obtain the most relevant comparable results to interpret the water and tissue concentrations. For this assessment, studies were limited to those reporting laboratory-only experiments with fish. Preference was given to those examining the effects in fathead minnow (*Pimephales promelas*) or another warm freshwater fish. For quality control, all studies must have had reported measured concentrations and included a range of concentrations. Exposures of longer duration were preferred. Responses included in the screening included decreases in survival, growth, or reproduction. No observed effect concentration (NOEC) or residue (NOER) and lowest observed effect concentration (LOEC) or residue (LOER) values were used from screened studies for comparison to measured concentrations. In some cases in which few TRVs were found in the available literature, median lethal concentration (LC50) and effects residue (ER) values were reported.

While the weight of evidence approach for evaluation of toxicity, chemistry, and bioaccumulation is one of the most rigorous methods for integration of data, there is significant uncertainty in its application to field conditions as well as other aquatic species. Uncertainty in the evaluation of water chemistry comes from the variability in water quality (i.e., hardness, pH) for published studies as well as this laboratory study compared to field conditions. Furthermore, the conditions represented in the elutriate bioassay were extreme; dilution and settling at the site are expected to result in metal concentrations lower than this study.

Uncertainty in the evaluation of metal in tissues is from the short duration of exposure in the elutriate bioassay and assumption regarding the species of metal. Concentration of metals in tissue of fish in relationship to toxicity is poorly understood (Society of Environmental Toxicology and Chemistry (SETAC) 2008). In an organism, metals have the capacity to partition in freely dissolved, protein-bound, or metal-rich granule fractions. Except for organo metals (e.g., methyl mercury) or selenium, it is difficult to relate tissue concentrations to biological effects (Luoma and Rainbow 2005, Phillips and Rainbow 1989).

Arsenic

Water

The measured dissolved As concentration in the EMR-WA was 0.8 µg/L. Measured dissolved As concentration in the SLC-WA was 77.9 µg/L. Mean dissolved As concentrations in the EMR-EL increased over the 240-hr elutriate preparation time from a concentration of 20.9 (\pm 3.9) µg/L at the 1-hr time point to 53.0 (\pm 1.1) µg/L at 240 hr. Dissolved As concentrations were higher in the SLC-EL than in the EMR-EL; the measured dissolved As concentration increased from 75.0 (\pm 3.0) µg/L at the 1-hr time point to a high of 81.9 (\pm 1.8) µg/L at the 96-hr time point. The measured dissolved As concentration at the terminal 240-hr time point was 81.3 (\pm 1.6) µg/L. As(V) was by far the predominant As species in both elutriate preparations (Figure 30).

All measured aqueous dissolved concentrations of As were below the Criterion Continuous Concentration (CCC) of 150 µg/L recommended by USEPA (2002c). The highest mean concentration of dissolved As measured in the either elutriate preparation, 81.9 (\pm 1.8) µg/L, is 1.8-fold less than the CCC. Also, literature toxicity reference values (TRVs) for *P. promelas* exposure to As were much higher than the conservative CCC value (Figure 60). Arsenic measured in the oxidized elutriates was present as As(V) and not the more toxic As(III). However, for the purpose of providing a conservative screening level comparison, these concentrations of As(V) in the elutriate are compared to TRVs for the more toxic As(III). The 30-day *P. promelas* growth no observable effect concentration (NOEC) and lowest observable effect concentration (LOEC) were 2,130 and 4,300 µg/L, respectively, for As(III) in a *P. promelas* early life stage exposure in which the test organisms are exposed as eggs and then for 30-day post fertilization (about 24-day post hatch) (Call et al. 1983). The concentrations of As in water were below all screening thresholds and unlikely to result in adverse effects to aquatic biota.

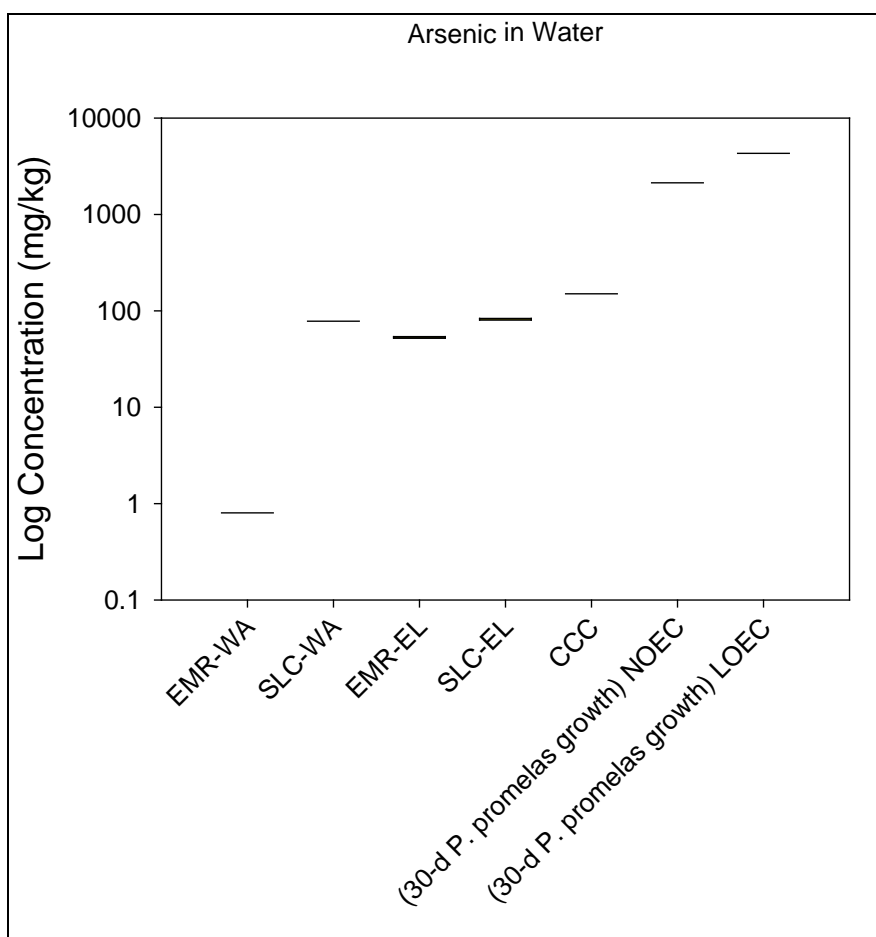


Figure 60. Dissolved arsenic concentrations in Emory River Reference water (EMR-WA), sluice water (SLC-WA), Emory River fly ash Elutriate (EMR-EL), sluice fly ash elutriate (SLC-EL), and the U.S. Environmental Protection Agency chronic water quality criterion (Criterion Continuous Concentration or CCC). Available toxicity reference values (TRVs) from the literature are summarized and defined in the definitions section. The exposure durations for the TRVs are indicated on the x-axis. Stand-alone horizontal lines indicate single points or tight distributions. ND = not detected (reporting limits = 1 µg/L).

Tissue

The whole body burden of As ranged from $0.37 (\pm 0.04)$ mg/kg wet weight in the EMR-WA to 2.95 ± 0.76 mg/kg wet weight in fish exposed to the 50% EMR-EL dilution. The 100% dilution yielded a mean As body burden of $2.84 (\pm 0.99)$ mg/kg wet weight.

The concentrations of As measured in the tissue of fish exposed to the EMR-WA are well below the literature TRVs for As in tissue; however, the highest amount of As in the whole fish body burden in the EMR-EL exposure, 2.95 ± 0.76 mg/kg wet weight, was above or approximately equal to various TRVs for As in tissue for *Lepomis macrochirus* (bluegill)

and *Oncorhynchus mykiss* (rainbow trout) (Figure 61) (Gilderhus 1966, McGeachy and Dixon 1990, Dixon and Sprague 1981). The elevated level of As in tissues is likely due to contributions of As from gut contents during analysis and unlikely to indicate toxicity to fish due to As in the test system.

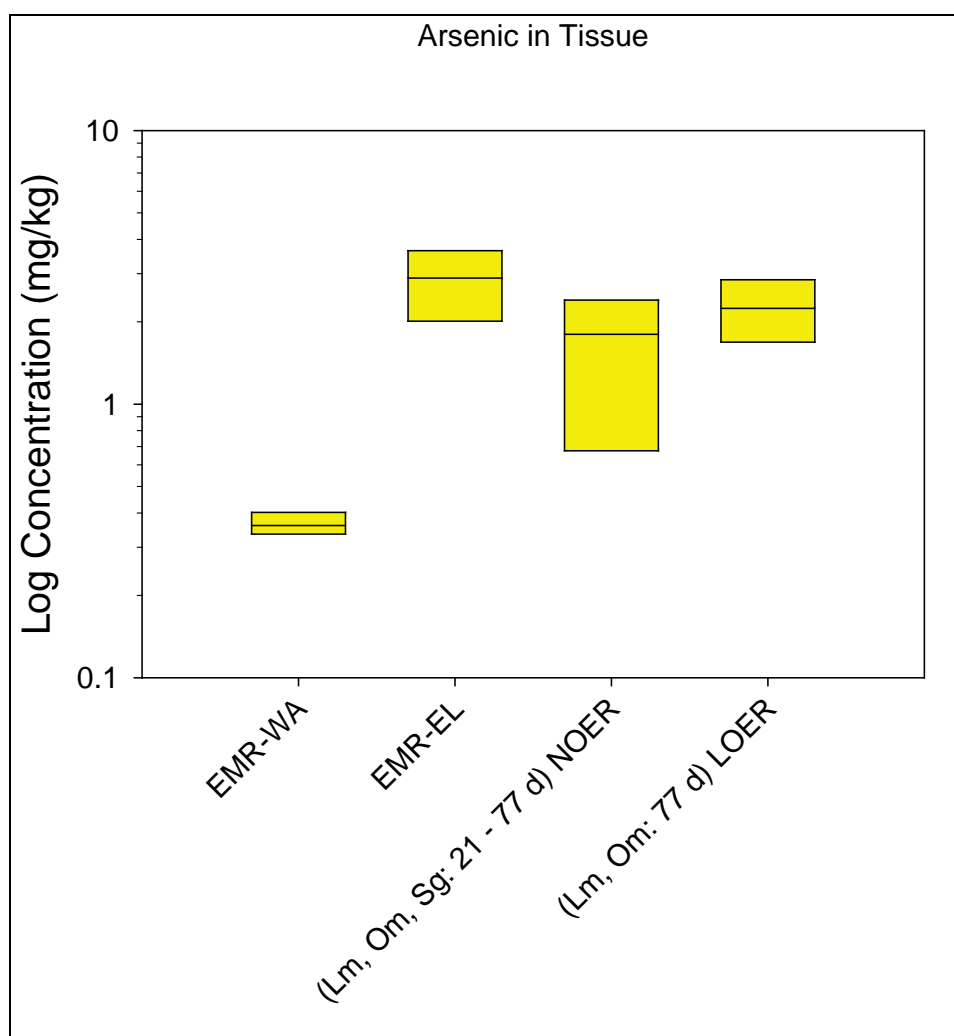


Figure 61. Arsenic concentrations (as wet weight, mg/kg) in whole *Pimephales promelas* exposed to EMR-EL-AF for 10 days. Available toxicity reference values (TRVs) from the literature are summarized and defined in the definitions section. The exposure durations for the TRVs are indicated on the x-axis. The ends of the boxes represent the 25th and 75th percentiles of the data distribution and the horizontal line indicates the median represented value. Stand-alone horizontal lines indicate single points or tight distributions. Lm = *Lepomis macrochirus*, Om = *Oncorhynchus mykiss*, Sg = survival and growth. Reporting limits = 0.5 mg/kg.

Barium

Water

Dissolved Ba was detected in the EMR-WA and sluice channel water (SLC-WA) at concentrations of 30.7 and 107.0 µg/L, respectively.

In the Emory River fly ash elutriate (EMR-EL), mean (\pm SD) dissolved Ba concentrations increased over the 240-hr elutriate preparation period from a concentration of 77.7 (\pm 5.1) at the 1-hr time point to 121.7 (\pm 3.8) µg/L after 240 hr of extended elutriate mixing in oxic conditions. Dissolved Ba levels were similar in the sluice fly ash elutriate (SLC-EL) and also increased over time, ranging from a concentration of 99.4 (\pm 0.5) to 116.7 (\pm 1.5) µg/L at the 1-and 240-hr time points, respectively.

There are no USEPA recommended water quality criteria for the protection of aquatic life for Ba. The measured concentrations in the 100% EMR-EL and SLC-EL elutriate waters were considerably lower than acute NOECs (Figure 62) for the invertebrate *Daphnia magna* (68,000 µg/L), a marine larval fish *Cyprinodon variegatus* (500,000 µg/L) that is likely more tolerant to metals than the freshwater *P. promelas* (Leung et al. 2001, Wheeler et al. 2002), and a maximum permissible concentration (MPC) that was modeled from ecotoxicology data and is used in the Netherlands (Crommentuijn et al. 2000). Few additional no-effect toxicity reference values for Ba were found in the literature. Effect levels (48-hr LC50 and EC50 values ranging from 32,000 to 410,000 µg/L) were found for *D. magna* (LeBlanc 1980; Khangarot and Ray 1989). These values are likely nominal (measurement techniques not reported) and the acute duration is unlikely to be protective under chronic exposure durations. Safety multipliers (e.g., 0.01, 0.05, 0.10) have been employed in the past to generate more protective values from acute LC50 values, but this approach has been criticized (National Academy of Sciences/National Academy of Engineering 1973; Mount 1977). However, acute to chronic ratios (acute LC50 divided by a chronic NOEC) do suggest some merit to AFs (Mount 1977, Verma et al. 1981, Giesy and Graney 1989, Heger et al. 1995, Lange et al. 1998, Ahlers et al. 2006), but it is clear that the magnitude of the application factor is chemical class specific (Roex et al. 2000). Application of the lowest of these factors (0.01) still results in toxicity reference values that are at least 2.6 fold higher than measured water concentrations. The USEPA's maximum contaminant level (MCL) for drinking water (2,000 µg/L; USEPA 2009) and human consumption of organisms and

water (1,000 µg/L; USEPA 2002c) guidelines are more than 16 and 8 times higher, respectively, than the Ba concentrations measured in the elutriate water. Overall, it is not expected that the concentrations of Ba in the investigated water samples present substantial toxicological implications.

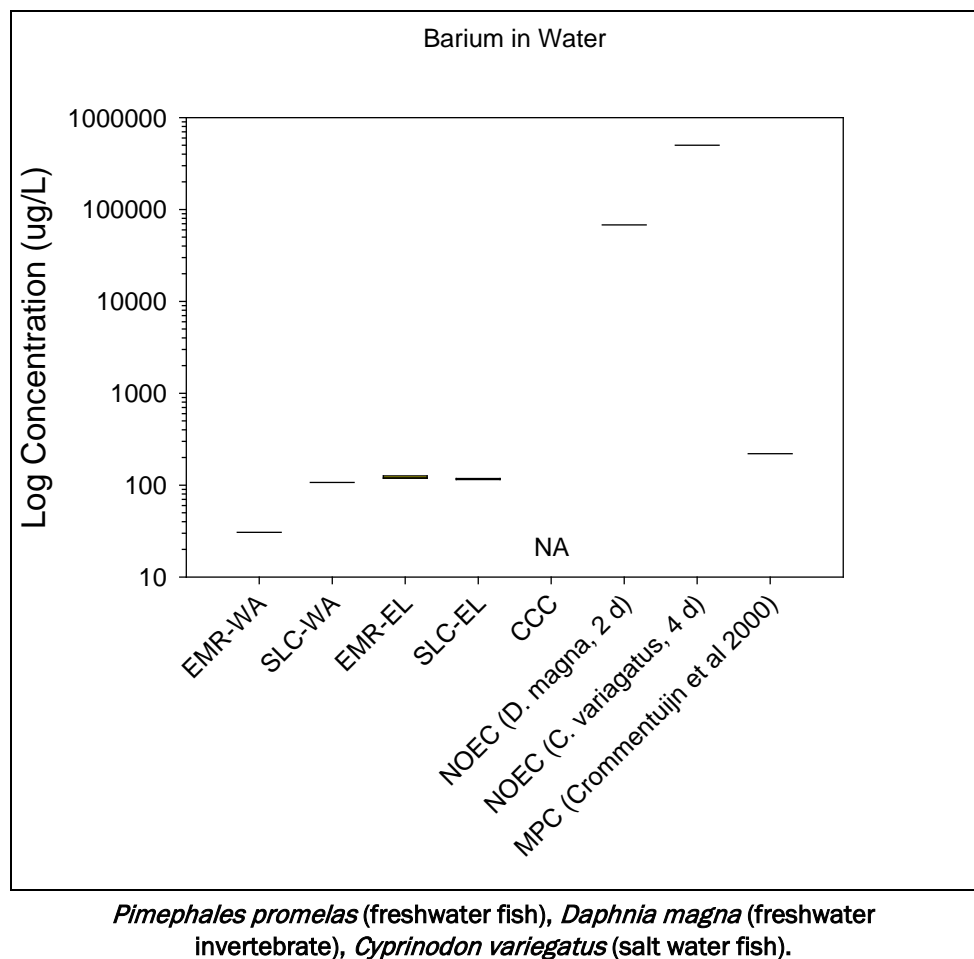


Figure 62. Dissolved barium concentrations in Emory River reference water (EMR-WA), sluice water (SLC-WA), Emory River fly ash elutriate (EMR-EL) and sluice fly ash elutriate (SLC-EL). Note that WQC are not available for barium but the USEPA drinking water quality criterion (MCL) is provided in the text. Available toxicity reference values (TRVs) from the literature are summarized and defined in the definitions section. The exposure durations for the TRVs are indicated on the X-axis. Stand-alone horizontal lines indicate single points or tight distributions. ND = not detected (reporting limits = 1 µg/L).

Tissue

In the EMR-EL bioaccumulation exposure of juvenile *P. promelas*, mean measured Ba body burdens ranged from 2.40 (\pm 0.52) to 20.24 (\pm 7.90) mg/kg wet weight in the lowest (0% elutriate) and highest (100% elutriate) treatments, respectively. No useful tissue residue benchmarks for Ba in fish were found in the available literature, except for one very low level

NOER of 0.15 mg/kg (Dube et al. 2005). This value represents an arbitrarily measured body burden that induced no reported effect. Since effects level body burden benchmarks were not found, a figure comparing Ba body burdens in the current study is not included in this report.

Chromium (III)

Water

The only chromium species found in this study was Cr(III), which is widely reported to be less toxic than the more heavily studied Cr(VI) (Baral et al. 2006, Farag et al. 2006). Dissolved Cr(III) ($<0.2 \mu\text{g/L}$) was not detected above detection limits in the Emory River reference water (EMR-WA) or sluice channel water (SLC-WA).

In the Emory River fly ash elutriate (EMR-EL), mean (\pm SD) dissolved Cr(III) concentrations increased over the 240-hr elutriate preparation period from a concentration that was less than DL ($<0.2 \mu\text{g/L}$) at the 1-hr time point to $1.8 (\pm 0.1) \mu\text{g/L}$ after 240 hr of extended elutriate mixing under oxic conditions. Dissolved Cr(III) levels were slightly lower in the sluice fly ash elutriate (SLC-EL) and also increased over time, ranging from less than DL ($<0.2 \mu\text{g/L}$) to $0.7 (\pm 0.0) \mu\text{g/L}$ at the 1-and-240 hr time points, respectively.

These values are less than the USEPA's (2002c) continuous criterion concentration (CCC) for dissolved Cr(III) of 74 and 21 $\mu\text{g/L}$ at water hardness of 100¹ and 22² mg/L as CaCO_3 , respectively. Figure 63 compares the measured Cr(III) concentrations in the water to the CCC and toxicity reference values found in the literature. All measured dissolved concentrations are well below a 48-hr NOEC (Baral et al. 2006) and a 30-day MATC (Spehar and Fiandt 1986) reported for *P. promelas*. Gendusa and Beitingger (1992) reported a 96-hr NOEC for *Lepomis macrochirus* of 5030 $\mu\text{g/L}$ that was excluded from the graph since data were found for *P. promelas*. Overall, Cr(III) would not be expected to be of toxicological concern since the measured concentrations in the 100% elutriates were more than 11 times lower than the CCC and 1000 times lower than a literature-reported MATC.

¹ Standard water hardness used in the water quality criterion document (USEPA 2002c).

² Lowest water hardness (22 mg/L as CaCO_3) measured by titration in a site water. This value was recalculated to be 30 mg/L as CaCO_3 using the measured concentrations of Ca and Mg.

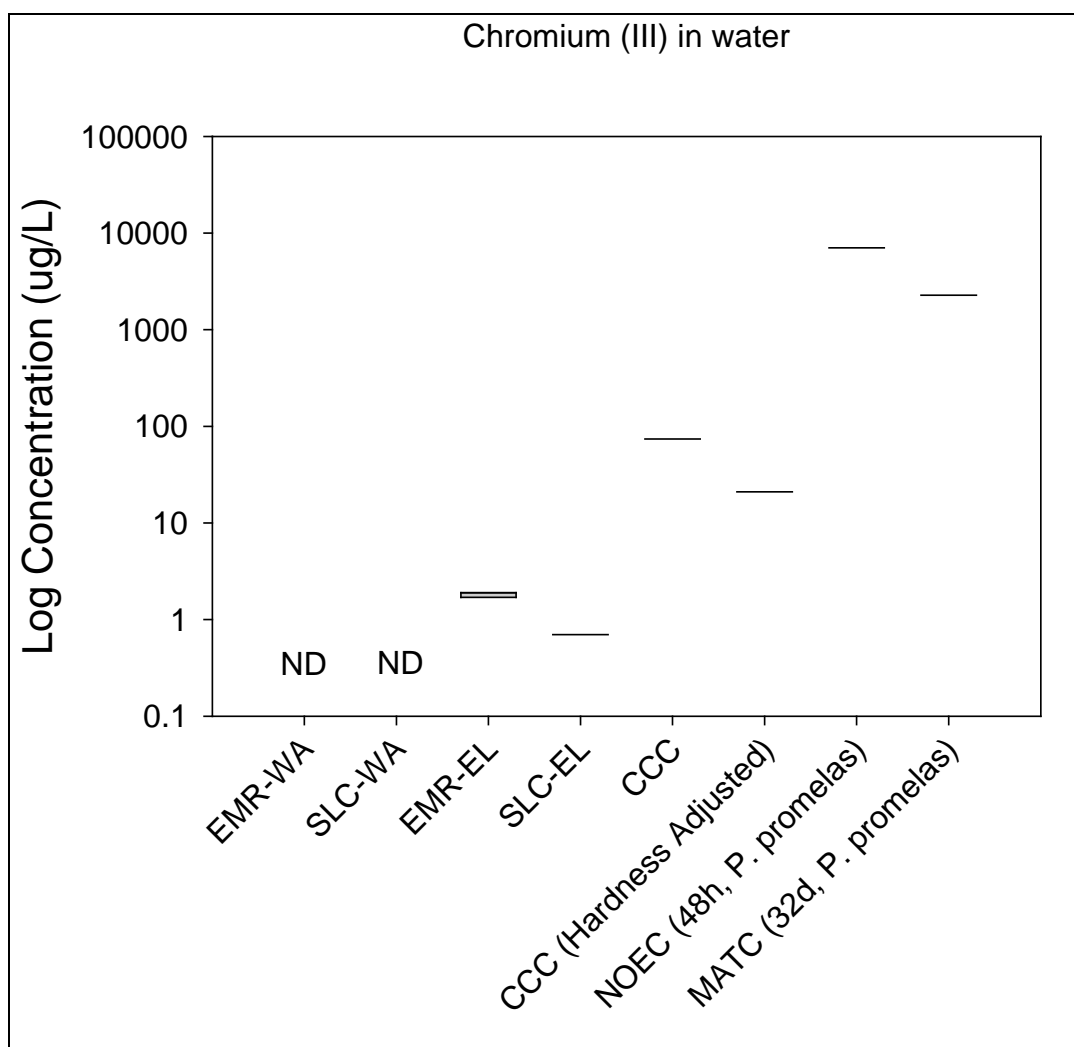


Figure 63. Dissolved chromium (III) concentrations in Emory River reference water (EMR-WA), sluice water (SLC-WA), Emory River fly ash elutriate (EMR-EL), sluice fly ash elutriate (SLC-EL), and the standard and hardness adjusted USEPA chronic water quality criteria (criterion continuous concentration or CCC). Available toxicity reference values (TRVs) from the literature are summarized and defined in the definitions section. The exposure durations for the TRVs are indicated on the X-axis. Stand-alone horizontal lines indicate single points or tight distributions. ND = not detected (reporting limits = 1 µg/L).

Tissue

In the EMR-EL bioaccumulation exposure of juvenile *P. promelas*, mean measured Cr whole body burdens (including gut contents) ranged from 3.53 (\pm 3.20) to 8.12 (\pm 5.13) mg/kg wet weight in the lowest (0% elutriate) and highest (100% elutriate) treatments, respectively (Figure 64). The median Cr body burden in the 100% elutriate treatment was comparable to a 108-day NOER reported for *Oncorhynchus tshawytscha* (Farag et al. 2006). Additionally, Roling et al. (2006) generated an ER15 (a tissue residue benchmark at which 15% mortality was modeled) of 44 mg/L for

Fundulus heteroclitus exposed to hexavalent Cr(VI). While this freshwater fish was exposed to the more toxic Cr(VI) species, this ER15 value is still five times higher than measured body burdens of the less toxic Cr(III).¹ It is not expected that the whole body burdens of Cr are of toxicological significance in the current investigation. In addition, most of the Cr detected was associated with the fish gut contents.

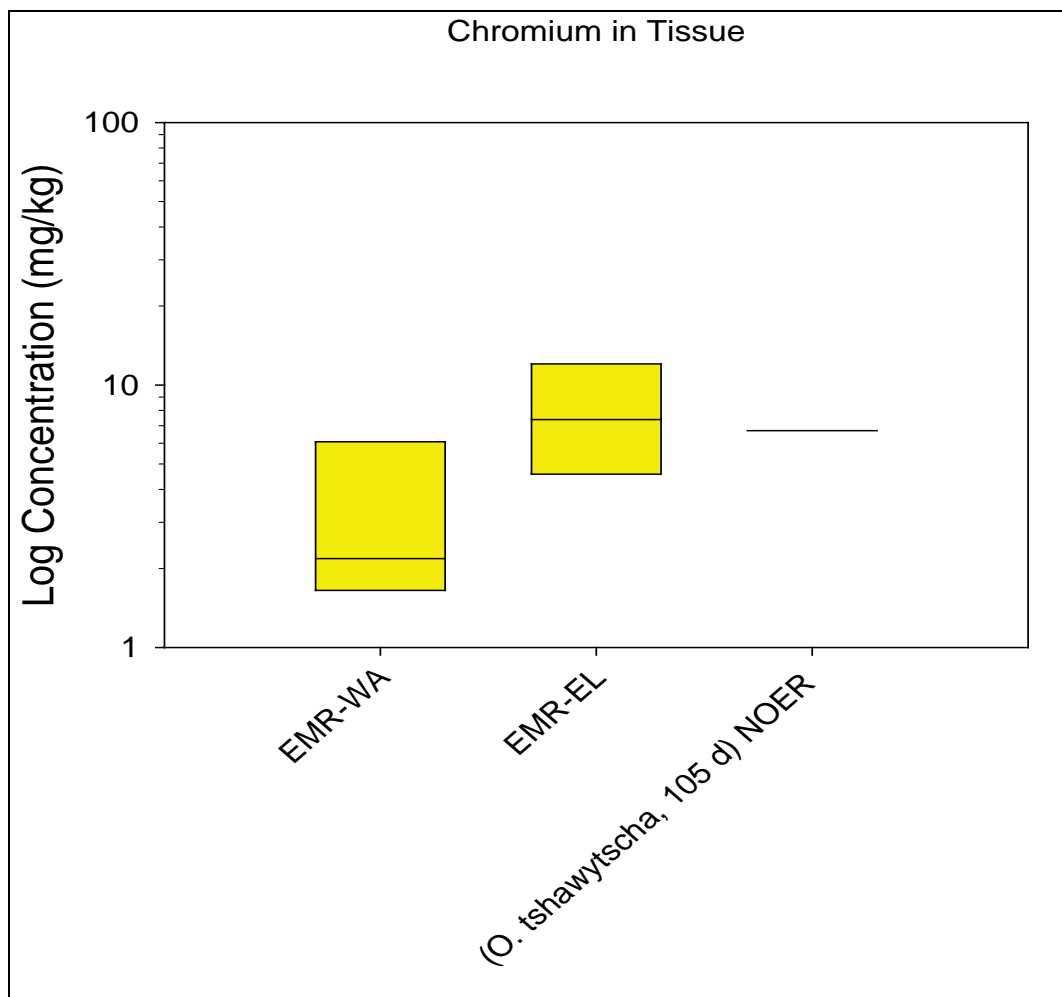


Figure 64. Chromium concentrations (as wet weight, mg/kg) in whole *Pimephales promelas* exposed to EMR-EL-AF for 10 days. Available toxicity reference values (TRVs) from the literature are summarized and defined in the definitions section. The exposure durations for the TRVs are indicated on the X-axis. The ends of the boxes represent the 25th and 75th percentiles of the data distribution and the horizontal line indicates the median represented value. Stand-alone horizontal lines indicate single points or tight distributions. Reporting limits = 0.5 mg/kg.

¹ Chronic WQC suggest Cr(VI) is 6.7 times more toxic.

Mercury

Water

The only inorganic Hg was found in this study, which is reported to be less toxic than methyl mercury (Friedmann et al. 1996). Dissolved Hg was below reporting limits ($DL < 0.005 \mu\text{g/L}$) in the Emory River reference water (EMR-WA) and sluice channel water (SLC-WA).

In the Emory River fly ash elutriate (EMR-EL), mean ($\pm SD$) dissolved Hg concentrations did not increase over time. In fact, the only detectable concentrations ($RL < 0.005 \mu\text{g/L}$) in the Emory fly ash elutriate (EMR-EL) were for the 1-hr ($0.014 \pm 0.001 \mu\text{g/L}$) and 24-hr ($0.011 \pm 0.007 \mu\text{g/L}$) timepoints. Similarly, Hg was only detected in the sluice elutriate (SLC-EL) in the 1-hr ($0.008 \pm 0.005 \mu\text{g/L}$) and 24-hr ($0.010 \pm 0.007 \mu\text{g/L}$) time points. These values are near reporting limits and should be interpreted cautiously. It is hypothesized that while the source of the Hg was likely the fly ash particles, the dissolved Hg either precipitated from solution or volatilized in the oxic conditions during the 10-day elutriate preparation.

The highest measured values of Hg are much less than the USEPA's (2002c) continuous criterion concentration (CCC) for dissolved Hg of $0.77 \mu\text{g/L}$. Figure 65 compares the measured Hg concentrations in the water to the CCC and toxicity reference values found in the literature. The measured dissolved concentrations are well below the median, long-term NOECs, and LOECs generated for *P. promelas* (Call et al. 1983; Snarski and Olson 1982). The large variability in the NOEC and LOEC data presented in Figure 65 are due in part to the inclusion of measurement endpoints that are inherently different in sensitivity (i.e., survival, growth, hatching success). Spehar and Fiandt (1986) reported a 32-day MATC for *P. promelas* growth of $0.89 \mu\text{g/L}$, a value 64 times higher than the Hg concentrations in the EMR-EL and SLC-EL elutriates. However, MATCs as low as $0.26 \mu\text{g/L}$ have been reported by others (Snarski and Olson 1982), a value that is still 19 times higher than the dissolved Hg concentrations in the elutriates. The MATC in Figure 65 is the median of the two values reported above. Overall, the dissolved Hg concentrations detected in the test elutriates are well below WQC (55 times lower) and toxicity reference values and are not likely to be toxicologically significant.

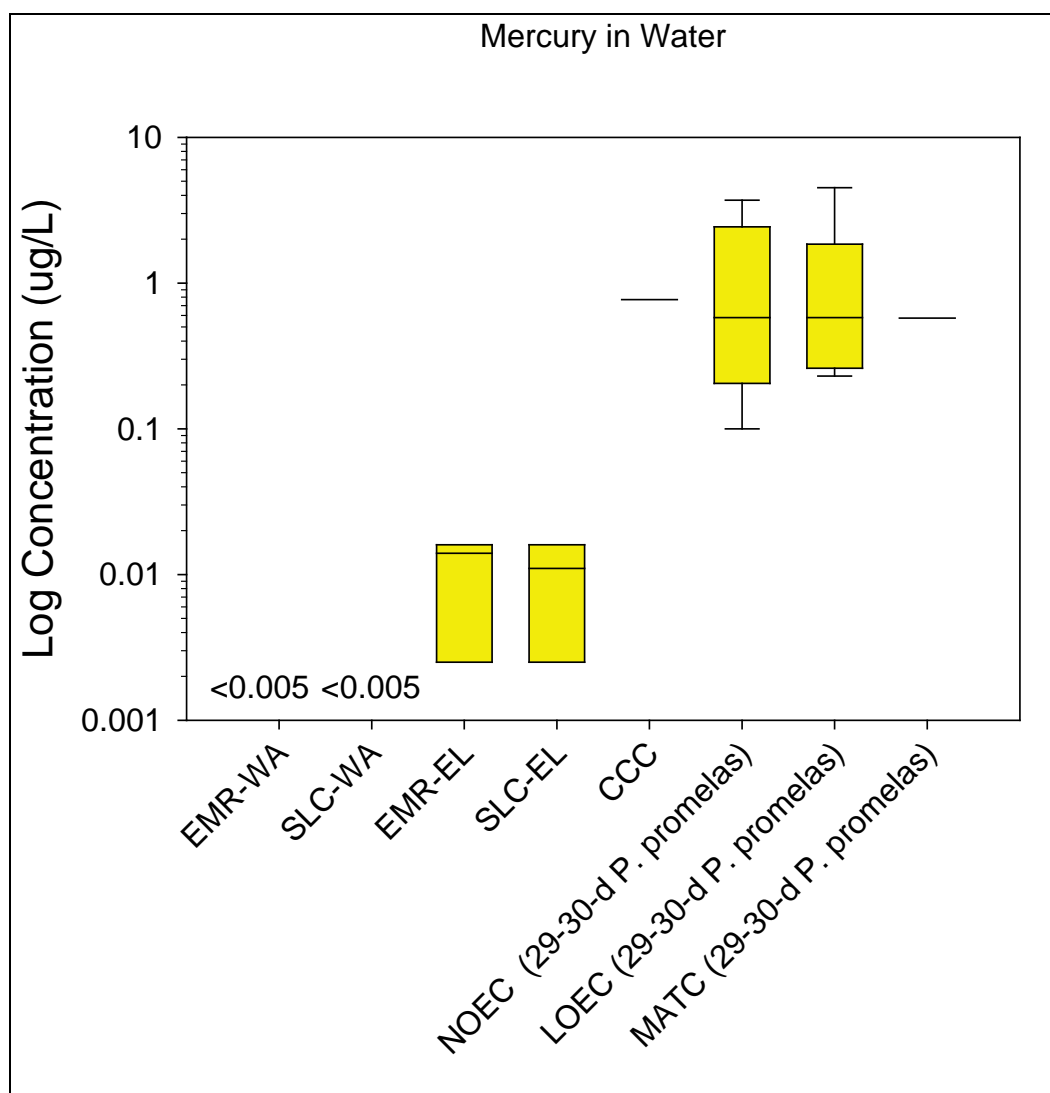


Figure 65. Dissolved mercury concentrations in Emory River reference water (EMR-WA), sluice water (SLC-WA), Emory River fly ash elutriate (EMR-EL), sluice fly ash elutriate (SLC-EL) and the USEPA chronic water quality criterion (criterion continuous concentration or CCC). Available toxicity reference values (TRVs) from the literature are summarized and defined in the definitions section. The exposure durations for the TRVs are indicated on the X-axis. The ends of the boxes represent the 25th and 75th percentiles of the data distribution, the horizontal line indicates the median represented value, and whiskers represent the 10th and 90th percentiles. Stand-alone horizontal lines indicate single points or tight distributions. ND = not detected (reporting limits = 0.005 µg/L).

Tissue

In the EMR-EL bioaccumulation exposure of juvenile *P. promelas*, mean measured Hg body burdens ranged from 0.017 (\pm 0.003) to 0.023 (\pm 0.005) mg/kg wet weight in the lowest (0% elutriate) and highest (100% elutriate) treatments, respectively (Figure 66). These body burdens are 87- and 130-fold lower than median NOERs and LOERs reported in the

literature (Snarski and Olson 1982; Friedmann et al. 1996) and more than eight times lower than the tissue threshold effect level (t-TEL) modeled by Beckvar et al. (2005). These data suggested the body burdens of Hg in the juvenile *P. promelas* are not high enough to be of toxicological significance. Further, metals burdens in this study were primarily associated with the gut contents.

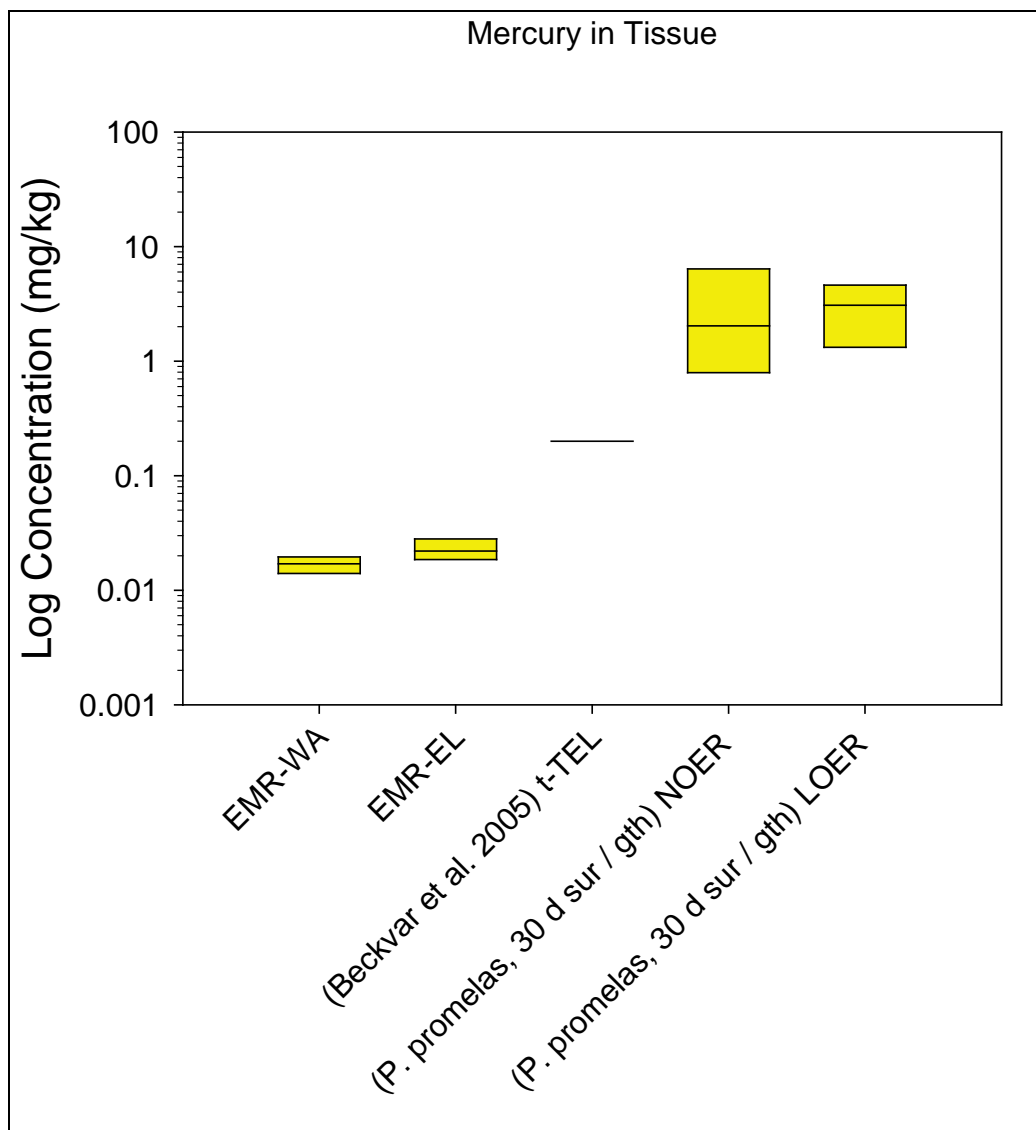


Figure 66. Mercury concentrations (as wet weight, mg/kg) in whole *Pimephales promelas* exposed to EMR-EL-AF for 10 days. Available toxicity reference values (TRVs) from the literature are summarized and defined in the definitions section. The exposure durations for the TRVs are indicated on the X-axis. The ends of the boxes represent the 25th and 75th percentiles of the data distribution and the horizontal line indicates the median represented. Stand-alone horizontal lines indicate single points or tight distributions. Reporting limits = 0.001 – 0.005 mg/kg.

Selenium

Water

Dissolved Se ($<0.2 \mu\text{g/L}$) was not detected above detection limits in the EMR-WA. The measured dissolved Se concentration in the SLC-WA was $5.9 \mu\text{g/L}$.

In the EMR-EL, mean dissolved Se concentrations increased over the 240-hr elutriate preparation time from a concentration of $0.7 (\pm 0.1) \mu\text{g/L}$ at the 1-hr time point to $5.5 (\pm 0.5) \mu\text{g/L}$ at 240 hr. Dissolved Se levels were higher in the SLC-EL and also increased over time, ranging from $5.6 (\pm 0.3)$ to $12.7 (\pm 0.1) \mu\text{g/L}$ at the 1- and 240-hr time points, respectively. Se(IV) was the only species of Se observed in both elutriate preparations (Figure 31).

The concentrations of Se in the SLC-WA as well as in both the EMR-EL and the SLC-EL, at least at some time point(s) over the 240-hr elutriate preparation period, exceed the USEPA's and the State of Tennessee's continuous criterion concentration (CCC) of $5 \mu\text{g/L}$ for Se in water (Figure 67). Thus, some concern for the potential of Se to contribute to chronic toxicity exists. However, as outlined in USEPA's (2004) Draft Aquatic Life Water Quality Criteria for Selenium, it is technically more valid to use a whole-body tissue concentration of Se as the chronic criterion because diet is the primary route of Se exposure that controls chronic toxicity in fish. Thus, the Se body burdens measured at the conclusion of the 10-day juvenile *P. promelas* toxicity and bioaccumulation study (discussed below) should be used as the primary assessment of potential Se impacts to fish in this investigation.

Also, even though exceedances of water CCCs were observed, all measured dissolved Se concentrations are well below no observable effect concentrations (NOECs) reported by Norberg-King (1989) in 7-day studies with larval *P. promelas* that ranged from 377 to $1,450 \mu\text{g/L}$ (Figure 67). Lowest observable effect concentrations (LOECs) for the same studies for the growth endpoint ranged from 836 to $2,920 \mu\text{g/L}$ (Norberg-King 1989). Thus, the highest concentration of Se measured in the SLC-EL, $12.73 (\pm 0.1) \mu\text{g/L}$, is at least 65-fold less than LOECs observed in this study.

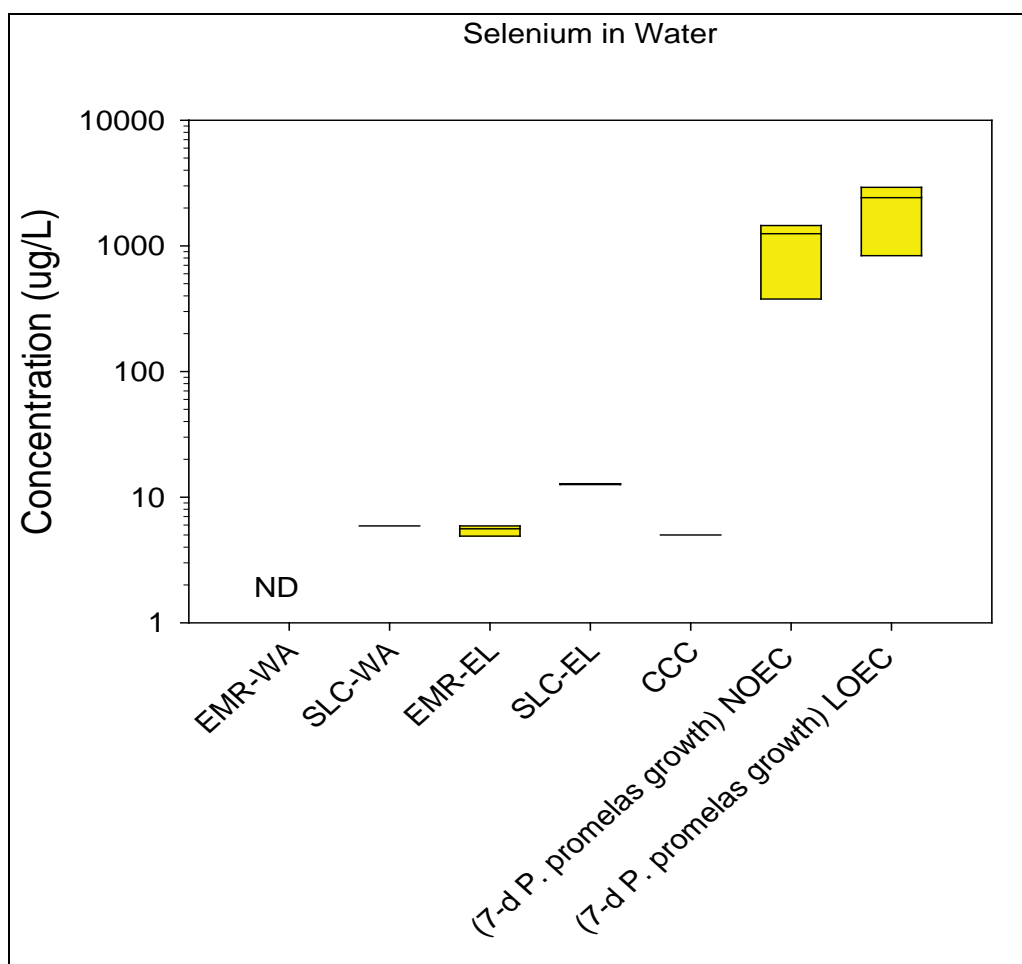


Figure 67. Dissolved selenium (predominately selenite) concentrations in Emory River reference water (EMR-WA), sluice water (SLC-WA), Emory River fly ash elutriate (EMR-EL), sluice fly ash elutriate (SLC-EL), and the USEPA chronic water quality criterion (criterion continuous concentration or CCC). Available toxicity reference values (TRVs) from the literature are summarized and defined in the definitions section. The exposure durations for the TRVs are indicated on the X-axis. The ends of the boxes represent the 25th and 75th percentiles of the data distribution and the horizontal line indicates the median represented. Stand-alone horizontal lines indicate single points or tight distributions. ND = not detected (reporting limits = 1 µg/L).

Tissue

In the EMR-EL bioaccumulation study, the highest mean measured Se tissue concentration was 2.91 (\pm 0.49) mg/kg dry weight. Wet weights of *P. promelas* measured in the study were converted to dry weights using an experimentally determined factor of 23.8% in order to compare to the USEPA (2004) chronic exposure criterion for Se in tissue that is given in dry weight, 7.91 mg/kg dry weight. The highest mean measured Se tissue concentration in fish exposed to the EMR-WA was 1.33 (\pm 0.14) mg/kg dry weight.

The highest measured tissue Se concentrations in the EMR-EL of 2.91 mg/kg dry weight is 2.7-fold less than the USEPA (2004) chronic exposure criterion for Se in tissue.

Also, all measured tissue Se values in this study are below literature LOER TRVs for *P. promelas* (Figure 68). TRVs used in this comparison are for larval and adult *P. promelas* obtained via water (Bertram and Brooks 1986, Schultz and Hermanutz 1990) and dietary exposure (Dobbs et al. 1996, Ogle and Knight 1989). This suggests the whole body burden of Se, which included gut contents, is unlikely to be of toxicological concern as measured in the current investigation. While some reported NOER TRVs are below tissue Se concentrations measured in fish exposed to the EMR-WA and EMR-EL, no effect levels such as NOERs can be an artifact of spacing of treatments in experimental design, so exceedances of these values do not necessarily imply that a significant toxic response will occur.

Vanadium

Water

Dissolved V was not detected above detection limits ($<0.2 \mu\text{g/L}$) in the EMR-WA. Measured dissolved V concentration in the SLC-WA was $50.9 \mu\text{g/L}$.

In the EMR-EL, mean dissolved V concentrations increased over the 240-hr elutriate preparation time from a concentration of $13.3 (\pm 2.7) \mu\text{g/L}$ at the 1-hr time point to $34.1 (\pm 0.1) \mu\text{g/L}$ at 240 hr.

Dissolved V concentrations were higher in the SLC-EL than in the EMR-EL. In the SLC-EL, the measured dissolved V concentration remained approximately the same over the 240-hr period, ranging from $53.5 (\pm 0.4)$ at the 1-hr time point to $52.7 (\pm 0.6) \mu\text{g/L}$ at the 240-hr time point, with a maximum concentration of $57.1 (\pm 0.1) \mu\text{g/L}$ measured at the 48-hr time point.

The measured dissolved V concentrations are lower than literature TRV values for V (Figure 69). The highest concentration of V observed in either elutriate preparation, $57.1 (\pm 0.2) \mu\text{g/L}$, is 5.3-fold lower than the lethal concentration to 5% (LC5) and 40.3-fold lower than the 7-day LC50 for *Danio rerio* (zebrafish) reported by Beusen and Neven (1987). The measured dissolved concentration of V is also almost 20-fold lower than a

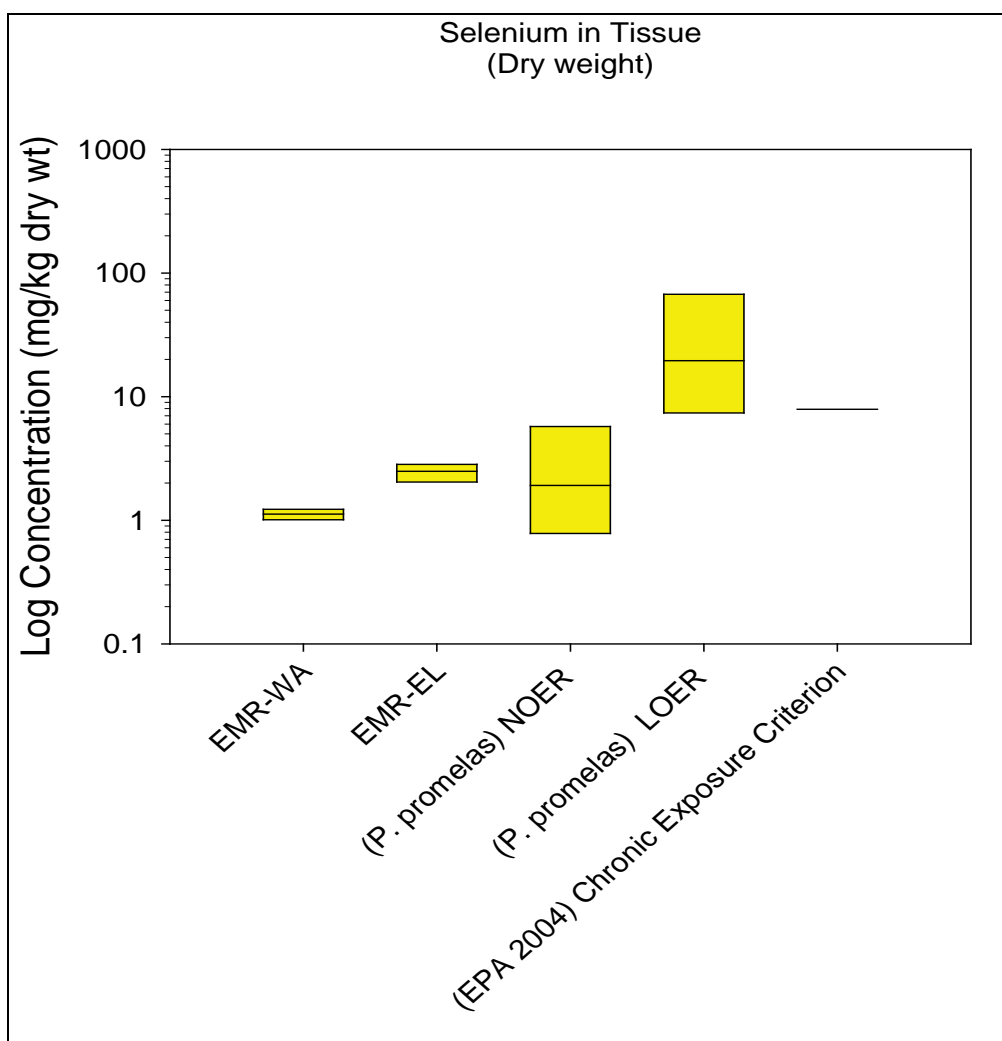


Figure 68. Selenium concentrations (converted to dry weight, mg/kg) in whole *Pimephales promelas* exposed to EMR-EL-AF for 10 days. Available toxicity reference values (TRVs) from the literature are summarized and defined in the definitions section. The exposure durations for the TRVs are indicated on the X-axis. The ends of the boxes represent the 25th and 75th percentiles of the data distribution and the horizontal line indicates the median represented. Stand-alone horizontal lines indicate single points or tight distributions. Reporting limits = 0.5 mg/kg.

28-day LC50 for *Jordanella floridae* (American flagfish) reported by Holdway and Sprague (1979). Unfortunately endpoints suggesting no effect (e.g., NOECs, MATCs, LC50) or screening values were not available for V. Obviously the LC50 values in the available literature (Figure 69) inherently present concentrations that induced adverse biological effects. Investigators have derived application factors (AFs) but these values were derived to adjust acute (96-hr) LC50 values, not chronic 28-day LC50 values, and are therefore not applicable to the available toxicity reference values for V.

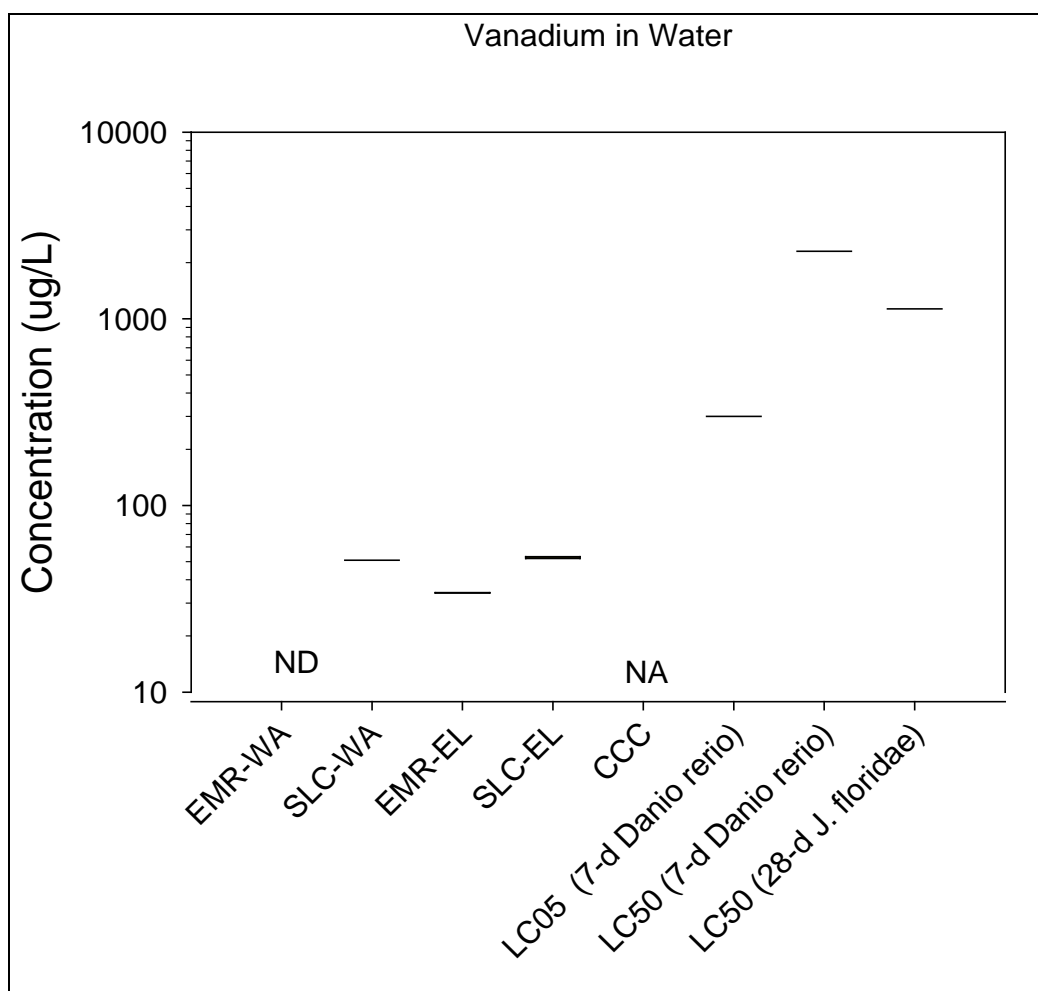


Figure 69. Dissolved vanadium (V) concentrations in Emory River reference water (EMR-WA), sluice water (SLC-WA), Emory River fly ash elutriate (EMR-EL), and sluice fly ash elutriate (SLC-EL). Note that no WQC was available for V. Available toxicity reference values (TRVs) from the literature are summarized and defined in the definitions section. The exposure durations for the TRVs are indicated on the X-axis. Stand-alone horizontal lines indicate single points or tight distributions. ND = not detected (reporting limits = 1 µg/L). NA = not available.

Tissue

In the EMR-EL bioaccumulation study, V body burden, including gut contents, ranged from 0.10 (\pm 0.05) mg/kg wet weight in the Emory River reference water to 4.06 (\pm 0.93) mg/kg wet weight at the 50% dilution. The V body burden in the fish exposed to the 100% dilution was similar at 3.88 (\pm 1.28) mg/kg wet weight. While the concentration of V in *P. promelas* exposed to EMR-WA was less than reported TRVs, the concentration of V in the *P. promelas* exposed to the EMR-EL exceeded NOER and LOERs reported by Holdway et al. (1983) for *J. floridae* (Figure 70). This indicates a potential for toxicity due to bioaccumulated V in the test system, although relative species-specific sensitivity to

bioaccumulated V between *P. promelas* and *J. floridae* is unknown. Also, the limited amount of available literature data on V bioaccumulation and toxicity to freshwater fish suggests that care should be taken in the interpretation of the above comparison of measured values to these TRVs. Furthermore, as described earlier, the concentration of metals in whole fish may be high due to the presence of fly ash in the gut of the fish.

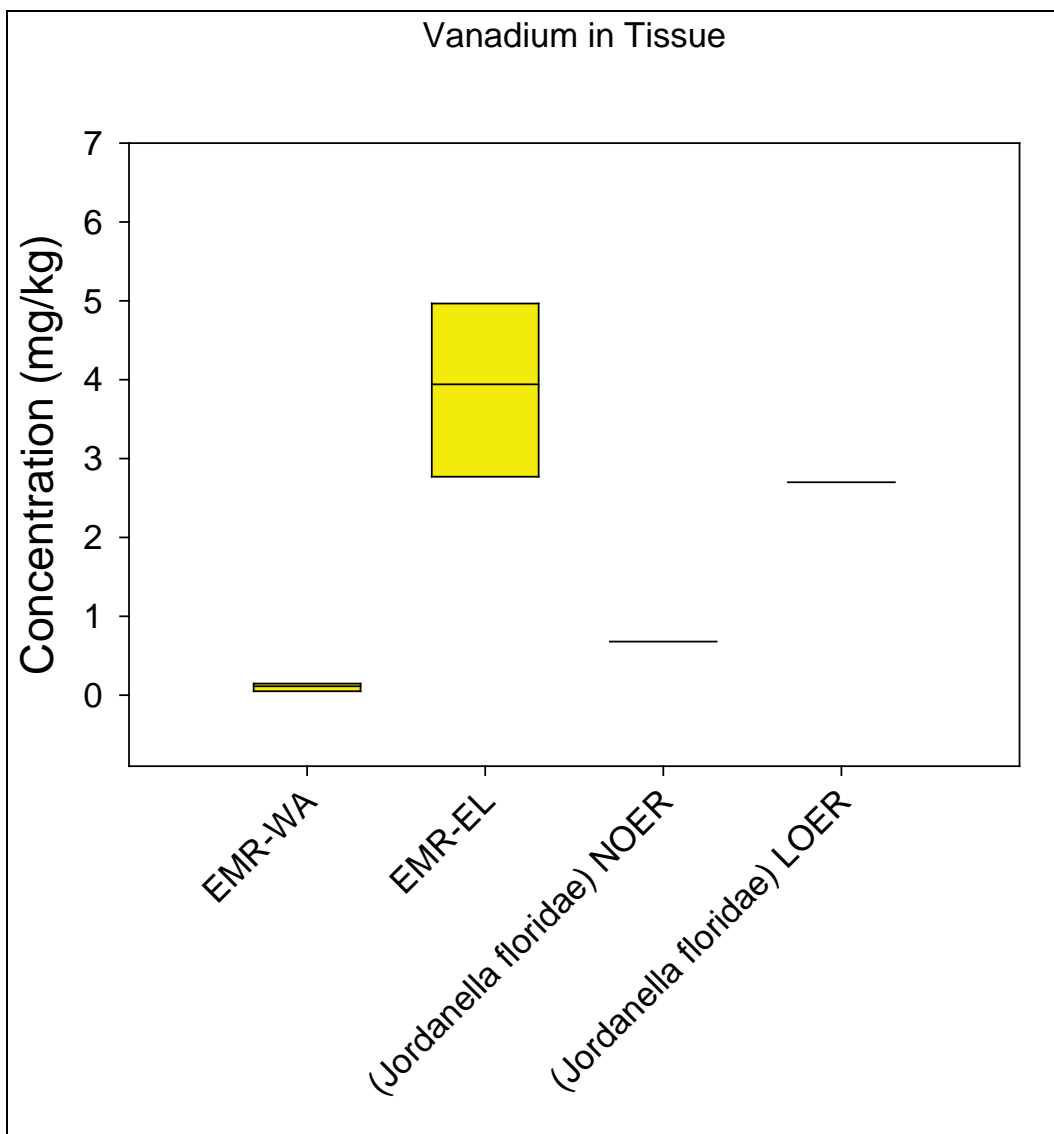


Figure 70. Vanadium concentrations (as wet weight, mg/kg) in whole *Pimephales promelas* exposed to EMR-EL-AF for 10 days. Available toxicity reference values (TRVs) from the literature are summarized and defined in the definitions section. The exposure durations for the TRVs are indicated on the X-axis. The ends of the boxes represent the 25th and 75th percentiles of the data distribution and the horizontal line indicates the median represented. Stand-alone horizontal lines indicate single points or tight distributions. Reporting limits = 0.5 mg/kg.

Stilling pond

The dredged fly ash initially enters the sluice channel (SLC) and proceeds to the stilling pond prior to discharge to the Emory River. Consequently, metals concentrations in the stilling pond may be more relevant to what the Emory River receives than metals concentrations in the field-collected sluice channel water or the sluice channel elutriate (SLC-EL, 10 g TSS/L). Thus, a comparison of the dissolved concentrations of the six metals of interest (As, Ba, Cr, Hg, Se and V) was made between the sluice channel water and the stilling pond (Table 19). These concentrations were also compared to water quality criteria (WQC) or toxicity reference values (TRV), where needed. Metals concentrations were lower in the stilling pond for As (73% lower) and V (38% lower), while the concentration of Se was comparable (8% lower) to the sluice channel water. However, higher concentrations of the other three metals were found in the stilling pond relative to the sluice water. While it must be noted that statistical comparison of these trends was not possible provided only a single analytical measurement was made in the stilling pond, it is interesting that two metals that were not detected in the sluice channel water (Cr and Hg) increased to detectable levels in the stilling pond. The third metal, Ba, increased by 64%. Furthermore, the concentrations of these three metals were higher in the stilling pond than in the laboratory prepared EMR-EL elutriate, which contained greater than 9 mg/L (i.e., the amount of additional fly ash added to the sluice water to prepare the extended elutriate) more fly ash than the sluice water that the stilling pond receives in the field.

Table 19. Comparison of dissolved metals concentrations (mg/L) in the stilling pond, sluice channel water, and sluice channel elutriate.

Metal	Stilling pond (µg/L dissolved)	Sluice Water (µg/L dissolved)	SLC-EL (Mean)	Water Quality Criteria (CCC)
As	20.8	77.9	81.9	150
Ba	175	107	117	NA
Cr	4.1	0.1	0.7	74 (21 at 22 mg/L as CaCO ₃)
Hg	0.014	0.0025	0.01	0.77
Se	5.4	5.9	12.7	5.0
V	31.7	50.9	52.7	NA

For the metals that have USEPA-recommended WQC (As, Cr, Hg, Se), dissolved metals concentrations in the stilling pond (Table 19) were below the criterion continuous concentration (or CCC), with the exception of Se (5.4 µg/L), which was slightly above the dissolved CCC of 5 µg/L (USEPA 2002c). Also noteworthy is that the more toxic selenate species was detected at a higher fraction (Table 20) than the other field and laboratory waters that contained predominately selenite. However, the concentration of Se in the stilling pond (5.4 µg/L) was lower than TRVs (Figure 67). Further, a more recent publication than the USEPA (2002c) national recommended water quality criteria document suggests that the CCC value of 5.0 µg/L is not appropriate and Se toxicity is better predicted by tissue residues than by concentrations in the water column (USEPA 2004). For the metals that did not have USEPA-recommended WQC (Ba, V), concentrations were considerably less than TRVs (Figures 62 and 69), a Dutch screening value for Ba (Crommentuijn et al. 2000) and are not expected to be of toxicological significance in the stilling pond.

Complete characterization of the stilling pond was not a goal of this project. However, because of the suggestive results described above, the stilling pond may be an area of interest for future study.

Gill histology and mussel bioassay

Fish histology and mussel bioassay investigations were conducted by separate laboratories and are provided as supplemental reports in Appendices H and I, respectively. In the fish gill histopathology study, no statistically significant differences in indices such as gill filament width were observed for fish exposed to fly ash elutriate. However, difficulties were reported in sectioning and mounting that resulted in a limited number of available samples (n = 10). Since there was less than desirable statistical power, it was not possible to form definitive conclusions. The 10-day mussel bioassay, performed with 5-month-old juvenile rainbow mussels (*Villosa iris*), showed no toxicity to the survival endpoint as determined by heartbeat in the 100%, 50%, or 10% EMR-EL or SLC-EL. However, a significant reduction in foot movement was observed in the 100% SLC-EL, indicating the potential for effects to mussel behavior. See Appendices H and I for details.

Conclusions

- No statistically significant adverse effects were observed for larval or juvenile fish exposed to the oxic regime elutriates prepared with fly ash from the Emory River. Histological analysis of the gills was inconclusive, and no effect was found on juvenile mussel survival.
- Dissolved As, Ba, Cr, Hg, V concentrations in the oxic regime elutriate were below the chronic water quality criteria and/or relevant literature or screening values.
 - Dissolved concentrations of As, Cr and Hg were below the CCC.
 - Ba and V concentrations were lower than literature-reported toxicity reference values.
- While the dissolved concentrations of Se measured in the Emory River elutriate (5.4 µg/L) and the sluice elutriate (12.7 µg/L) exceeded the CCC = 5.0 µg/L for total Se, it is generally understood that tissue residues are more predictive of Se toxicity than are water concentrations (USEPA 2004).
- In general, concentration of metals in tissues increased in a dose-dependent manner. However, this increase is likely due to metals present in the gut as ingested fly ash, not metals integrated into the tissue.
 - Arsenic (As) was near reference values reported in the literature at which effects are observed. However, this was a conservative assessment because the less toxic arsenate (As V) dominated in the oxic regime elutriates, but the levels in water were compared to screening values derived for the more toxic arsenite (As III).
 - There was very little literature data and no screening values to compare barium (Ba) concentrations in tissues.
 - Chromium (Cr) was present as Cr(III) and at concentrations near the NOER from literature studies.
 - Mercury (Hg) and selenium (Se) concentrations in tissues were below relevant screening values.
 - Vanadium (V) exceeded literature-based screening values, but the elevated concentrations are likely the result of fly ash in the gut.
- In a weight-of-evidence approach where chemistry, toxicity, and bioaccumulation data are integrated, these results suggest little

- potential for toxicity to related fish species given the extreme conditions represented by the oxidized elutriates in this study.
- Several areas of uncertainty could be addressed through additional data collection including longer-term exposures of fish to suspended or bedded fly ash, assessing food web exposure or trophic transfer, and evaluation of sensitive species not assessed in this study. Further characterization of stilling pond effluent may also be useful in future endeavors.

7 Comparison of Laboratory Elutriate Results to Field Observations

Summary

Elutriate tests are generally used to predict contaminant releases to surface waters by dredging and disposal activities. These tests are performed during the planning or design stages of a project to provide an a priori estimate that can in turn lead to regulatory approval to proceed with the project or to defining a need for alternative disposal sites or operational controls to reduce contaminant releases. The laboratory test conditions for the standardized tests were selected to mimic field conditions and were then validated against field data. The elutriate test procedures used in this study deviated from standard procedures in order to investigate potential shifts in metal speciation for fly ash-water mixtures exposed to oxygen for an extended time period. Metal contaminants, dissolved and particulate, that escape the dredging and disposal area are exposed to oxygen-rich receiving waters for time periods exceeding the dredging and disposal times. Consequently, the terminal mixing times for the experiments used in this study were extended beyond the normal 1-hr mixing time.

Applying the elutriate concentrations for total metals measured by this study after 240 hr of mixing to estimates of contaminant loadings from the project area to the receiving streams is not an appropriate use of the data because the experimental conditions differ from field operational parameters. Additionally, making contaminant loading estimates based on elutriate studies is not necessary for the Kingston site because at this point in time TVA and TDEC monitor the points of contaminant release providing direct field observations of contaminant concentrations for the stilling pond effluent and for the suspended solids plume produced by the dredge(s) operating in the Emory River. A USEPA Panel (2009) stated in its recent review of potential selenium issues for this site, "However, it should be noted that it is the Panel's opinion that the continued monitoring of unspciated selenium in the water is the best current basis for assessing the potential hazards of any changes in selenium concentrations, whether through this proposed pathway, or through other means."

This section of the report will compare the laboratory elutriate observations to TVA field observations, as well as illustrate the monitoring program results for various stations in the Emory, Clinch, and Tennessee Rivers. TVA provided ERDC the field monitoring data¹ for the dredging period (late March through early August) with the notation that all of the data have been verified, but many of the data have not been fully validated. TVA provided this statement of caution regarding use of the field monitoring data.²

The following data set has not been fully validated and should be used with some caution until validation is completed. TVA and TVA's data management contractor, Environmental Standards, Inc., believe the data to be of suitable quality for internal agency use, but data may be subject to recall and correction if errors are found during validation. Until validated, the data should not be released publicly.

The elutriate supernatant samples analyzed for the laboratory study were collected after 1 hr of settling. As shown in Figure 71, the total suspended solids concentrations in the elutriate supernatants, which were analyzed for metals, ranged from 400 to 500 mg/L. In comparison, the total suspended solids concentrations measured by the field monitoring program at the point of release to the river averages 32 mg/L in the dredge plume (approximately 200 yd downstream of the dredge)³ and 13 mg/L in the settling pond effluent (Figure 71). Therefore, once the resuspended sediment from the dredge or the impoundment effluent is released to the river, the solids concentration and, hence, the mass of metals available for desorption from the solids to the water column, is reduced by more than an order of magnitude compared to the elutriate mixtures.

Figures 72-75 compare the dissolved concentrations of arsenic, barium, selenium, and vanadium measured in the Emory River elutriate supernatants after 1 hr and after 240 hr of mixing to field observations of the maximum concentration of these metals in the dredging plume. All of the data sets for the field monitoring program included a number of values below the reportable detection limits. Each of these values was assumed a

¹ Personal Communication. August 21, 2009. Robert Crawford, Sampling and Monitoring Coordinator, Tennessee Valley Authority, Kingston, TN.

² Personal Communication. August 24, 2009. William Rogers, Ph.D., Sampling and Monitoring Coordinator, Tennessee Valley Authority, Kingston, TN.

³ Personal Communication. July 23, 2009. Neil Carriker, Ph.D., Program Manager, Special Projects, Tennessee Valley Authority, Kingston, TN.

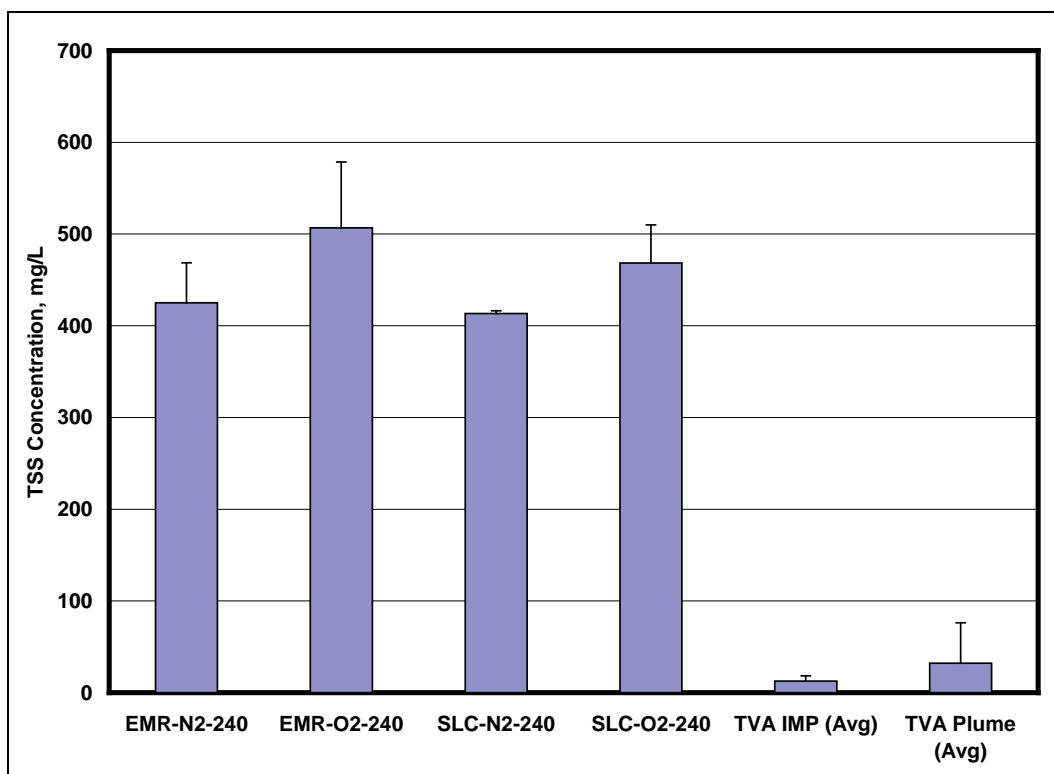


Figure 71. Elutriate supernatant TSS concentrations compared to field observations (verified, not validated) by TVA.

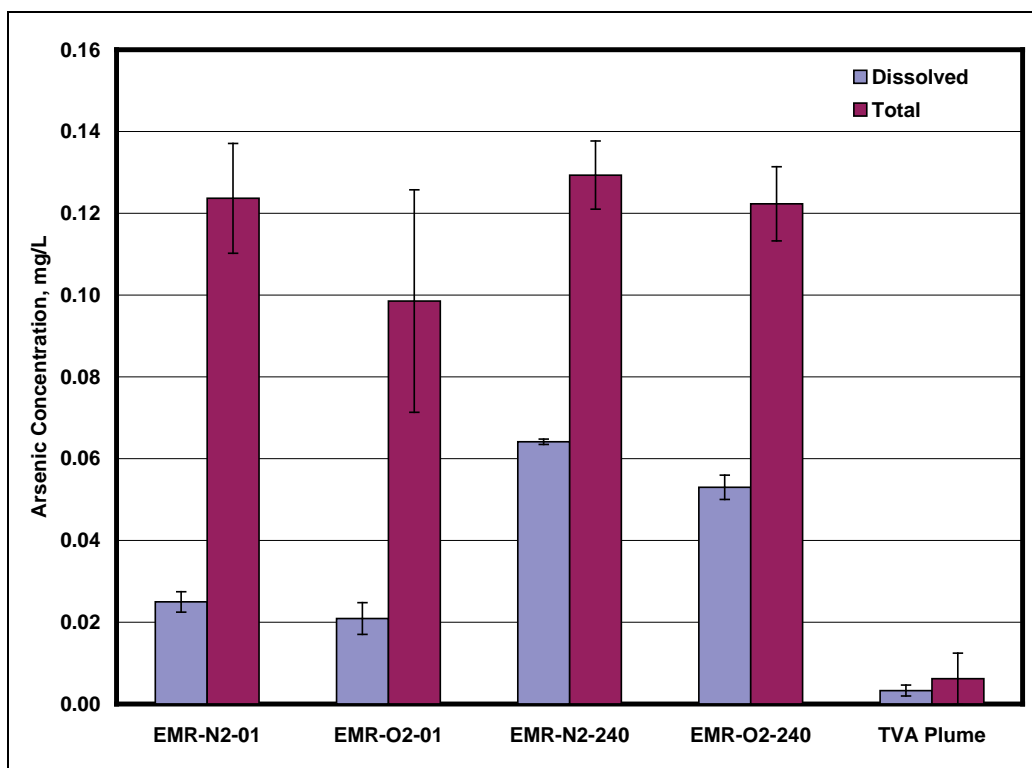


Figure 72. Emory River elutriate supernatant arsenic compared to TVA's field observations (verified, not validated) of the dredge plume.

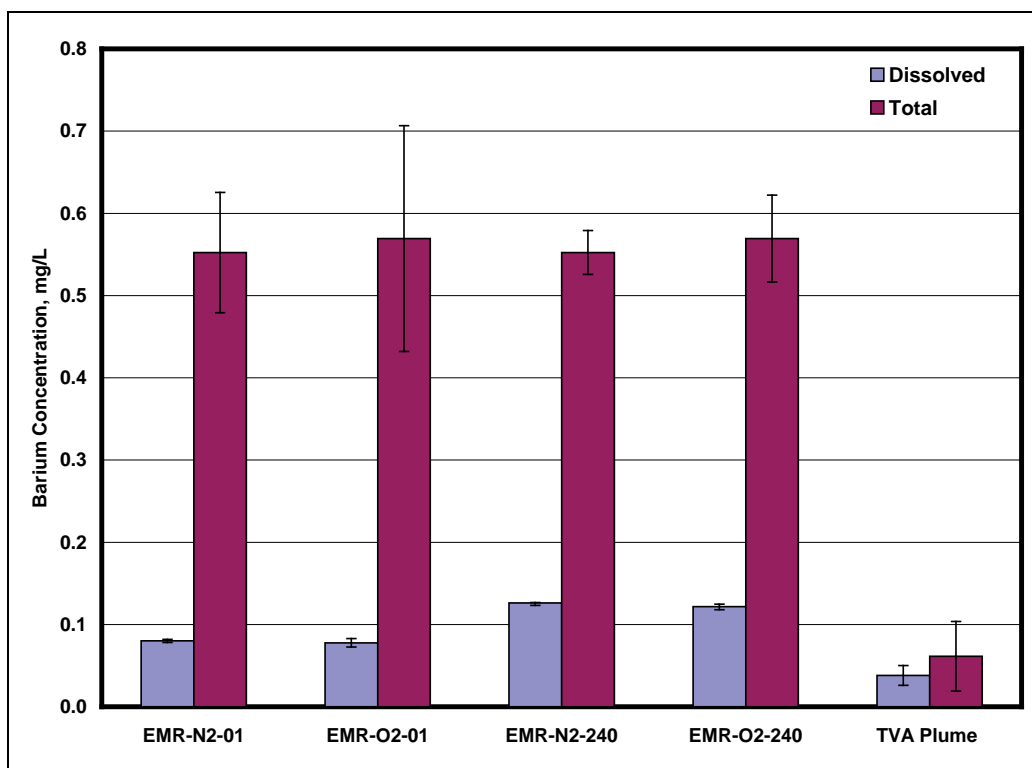


Figure 73. Emory River elutriate supernatant barium compared to TVA's field observations (verified, not validated) of the dredge plume.

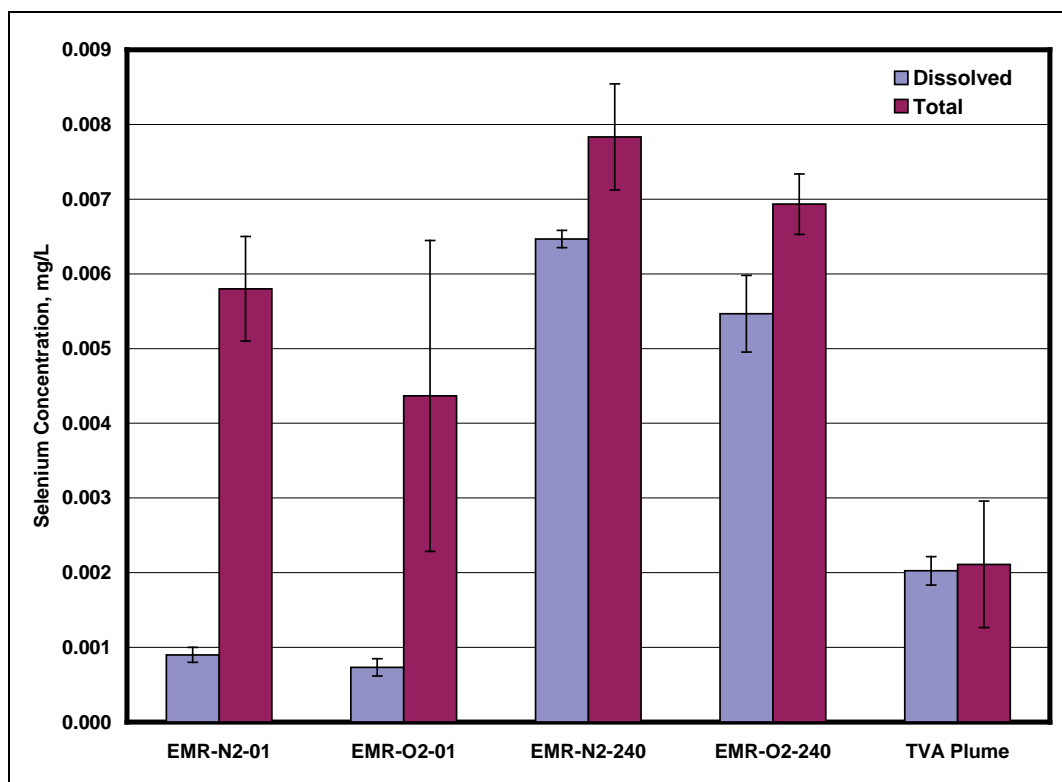


Figure 74. Emory River elutriate supernatant selenium compared to TVA's field observations (verified, not validated) of the dredge plume.

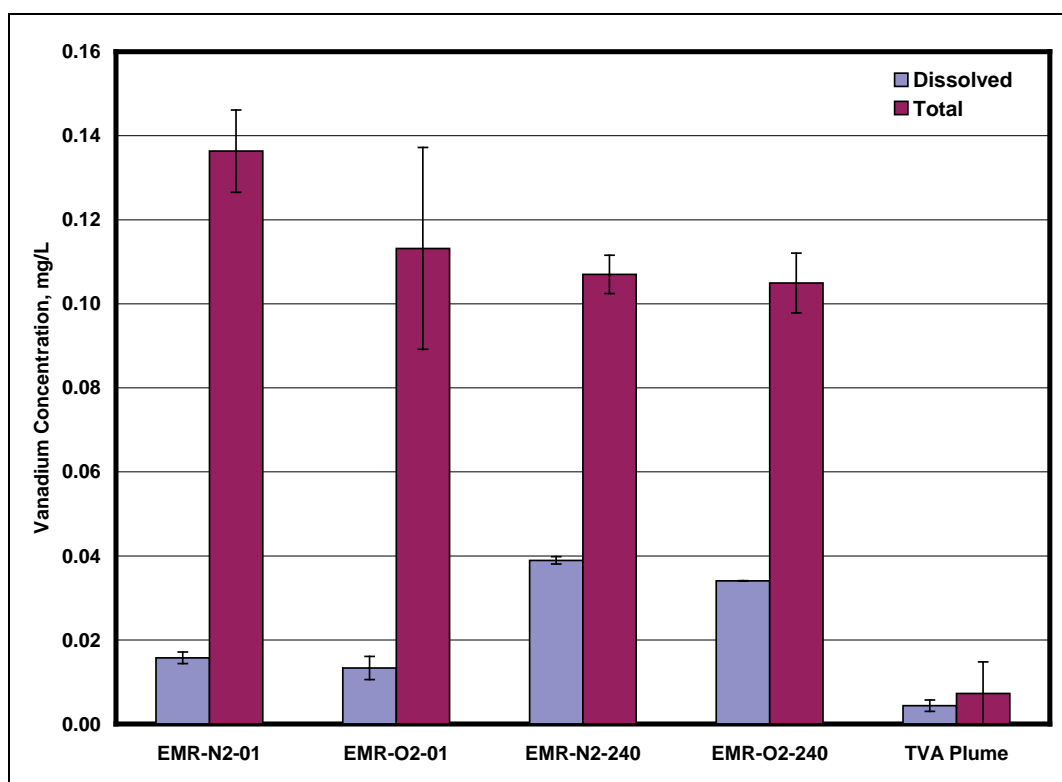


Figure 75. Emory River elutriate supernatant vanadium compared to TVA's field observations (verified, not validated) of the dredge plume.

value equal to the detection limit; therefore, the averages illustrated throughout this section of the report for field observations are greater than the true average. The arsenic, barium, and vanadium elutriate concentrations for both 1-hr and 240-hr mixing times exceeded the field monitoring observations, suggesting that the elutriate tests overestimate contaminant releases. The 1-hr elutriate dissolved concentrations are greater than the field values by a factor of 2 to 6 for the elutriates mixed with air; whereas, the 240-hr elutriates overestimate concentrations for these metals by a factor of 3 to 16. Fifty percent of the plume dissolved arsenic values were below a detection limit of 0.002 mg/L, and 80 percent of the plume dissolved vanadium values were less than 0.004 mg/L.

Figure 74 indicates that selenium concentrations in the Emory River 1-hr elutriate underestimate plume values by a factor of 3, but the 240-hr elutriate overestimates the field observations by a factor of 3. The plume selenium values are biased high because only 2 of 96 observations found selenium above the detection limit of 0.002 mg/L. If one half the detection limit were assumed for the non-detects, the lab and field concentrations for the 1-hr elutriate would compare favorably.

Figures 76 and 77 compare the dissolved concentrations of arsenic and selenium measured in the sluice channel elutriate supernatants after 1 hr and after 240 hr of mixing to field observations of the concentration of these metals in the stilling pond effluent (TVA discharge No. AP_IMP001). (Field observations for barium and vanadium were not available for comparison.) Complicating this comparison is the fact that the plant ash discharge mixes with and dilutes the dredge flow prior to entering the pond system. Arsenic and selenium contributions from the plant release, as well as relative flows from the plant and dredge streams would be needed to further assess the effects of the plant discharge. Figure 76 shows that both the 1-hr and the 240-hr elutriates overestimate the arsenic concentration in the pond effluent by a factor of 5. However, Figure 77 shows that the 1-hr elutriate approximates the pond selenium concentrations very well, and the 240-hr selenium elutriate is greater than the monitored value by a factor of 3. Figure 77 also suggests that essentially all of the elutriate selenium, as well as that in the pond, is in the dissolved or filterable fraction compared to the total (particulate plus dissolved) selenium.

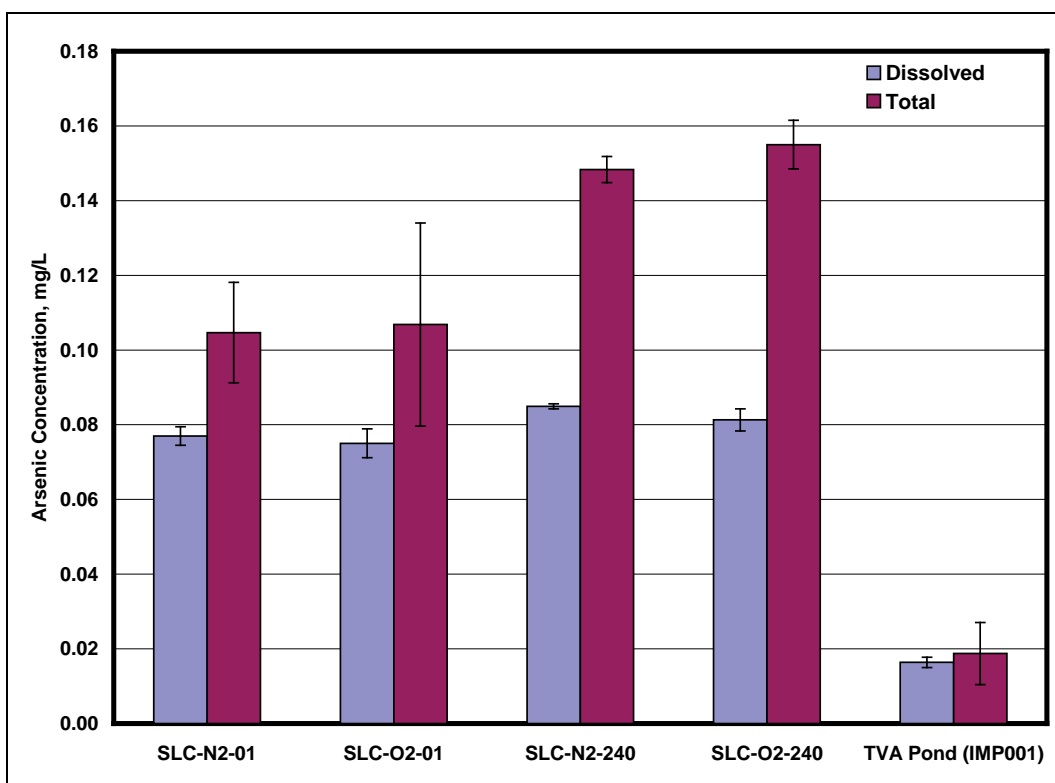


Figure 76. Arsenic in sluice channel elutriate supernatant arsenic compared to TVA's field observations (verified, not validated) of stilling pond effluent (AP_IMP001).

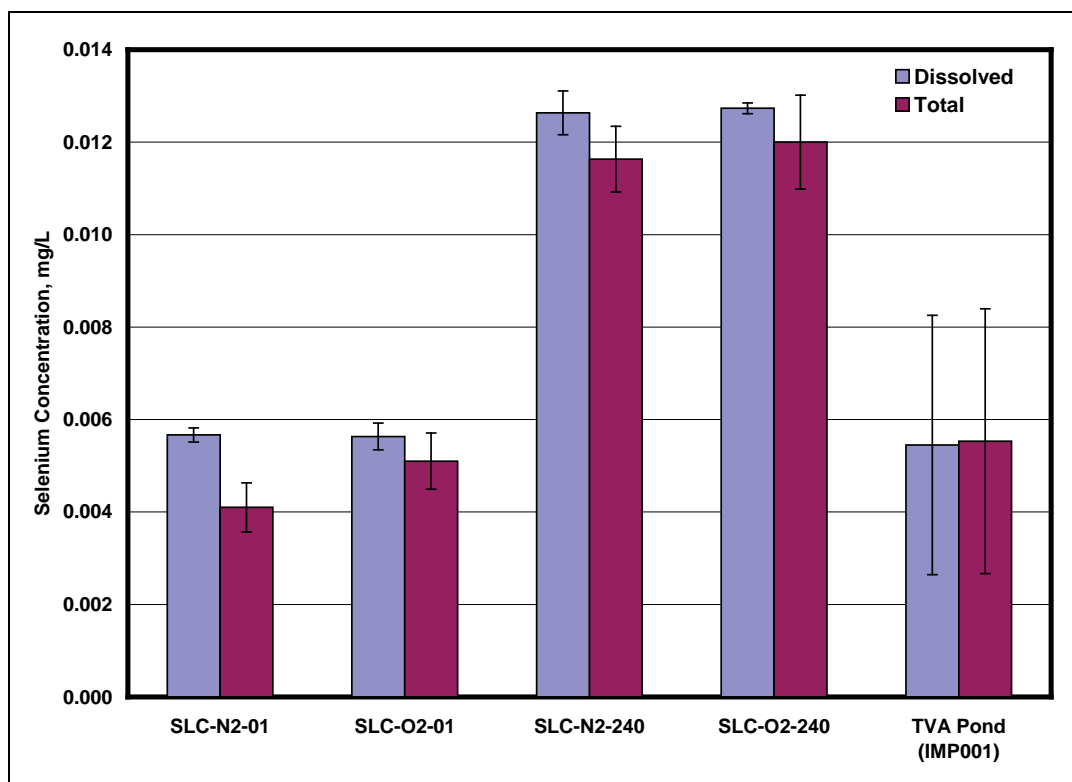


Figure 77. Selenium in sluice channel elutriate supernatant selenium compared to TVA's field observations (verified, not validated) of stilling pond effluent (AP_IMP001).

Figures 78-81 show the particulate concentration of arsenic, barium, selenium, and vanadium, respectively, for the elutriates and the field samples as well as the single analysis of the Emory River and sluice materials used as the basis for the elutriates. These values were calculated by the difference in the total and dissolved analyses divided by the suspended solids concentration. Generally, the values for arsenic, barium, and vanadium are all the same order of magnitude and with less than a factor of three from the highest to the lowest. The elutriates and field samples are slightly enriched with metals compared to the original ash samples. Because the selenium dissolved and total concentrations were very nearly the same, the calculated particulate values are near or below zero (analytical anomaly). The large variability in the field selenium observations are explained in part by the large number of total and dissolved samples reported as below the detection limit.

Figure 82 illustrates the trend in suspended solids concentrations upstream and downstream of the plume measurement. Where the upstream (background) suspended solids concentration averages 8 mg/L and plume concentration averages 31 mg/L, the downstream stations drop

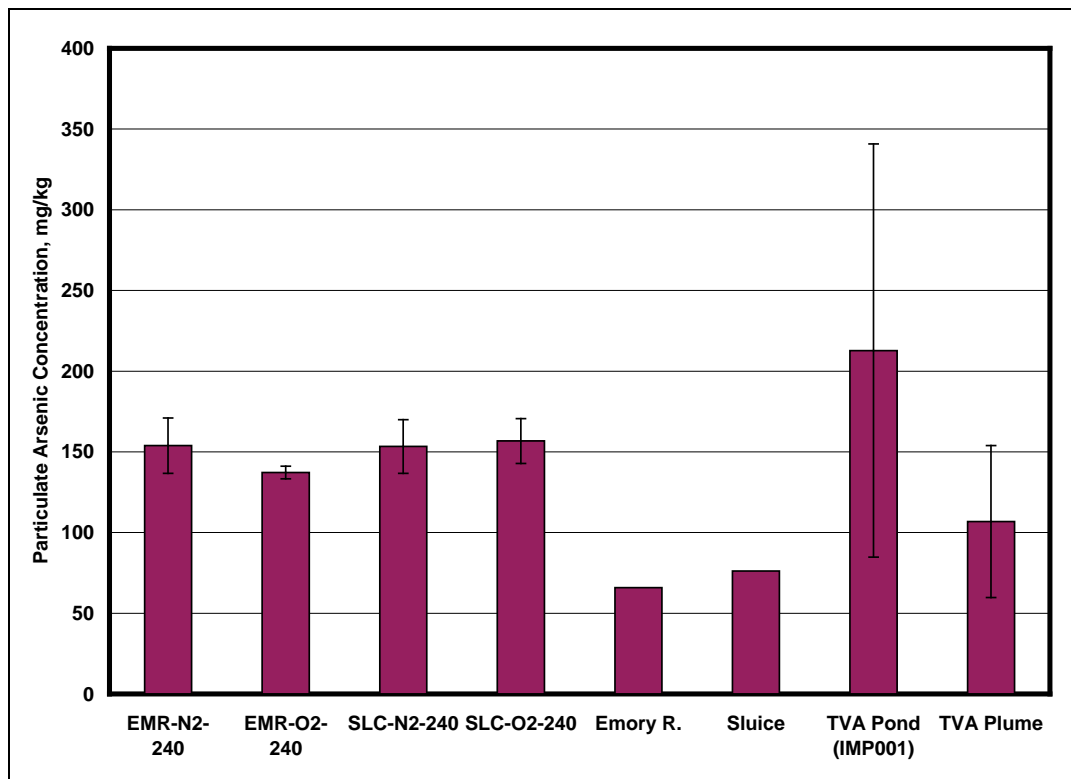


Figure 78. Particulate arsenic concentrations (verified, not validated).

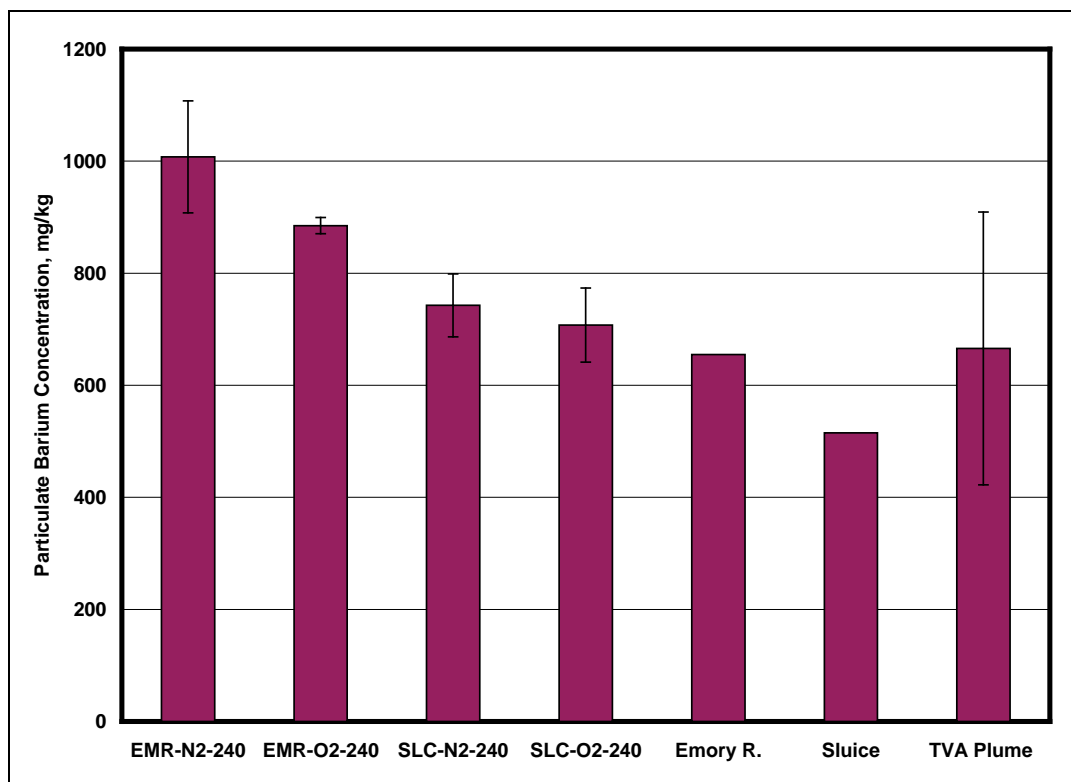


Figure 79. Particulate barium concentrations (verified, not validated).

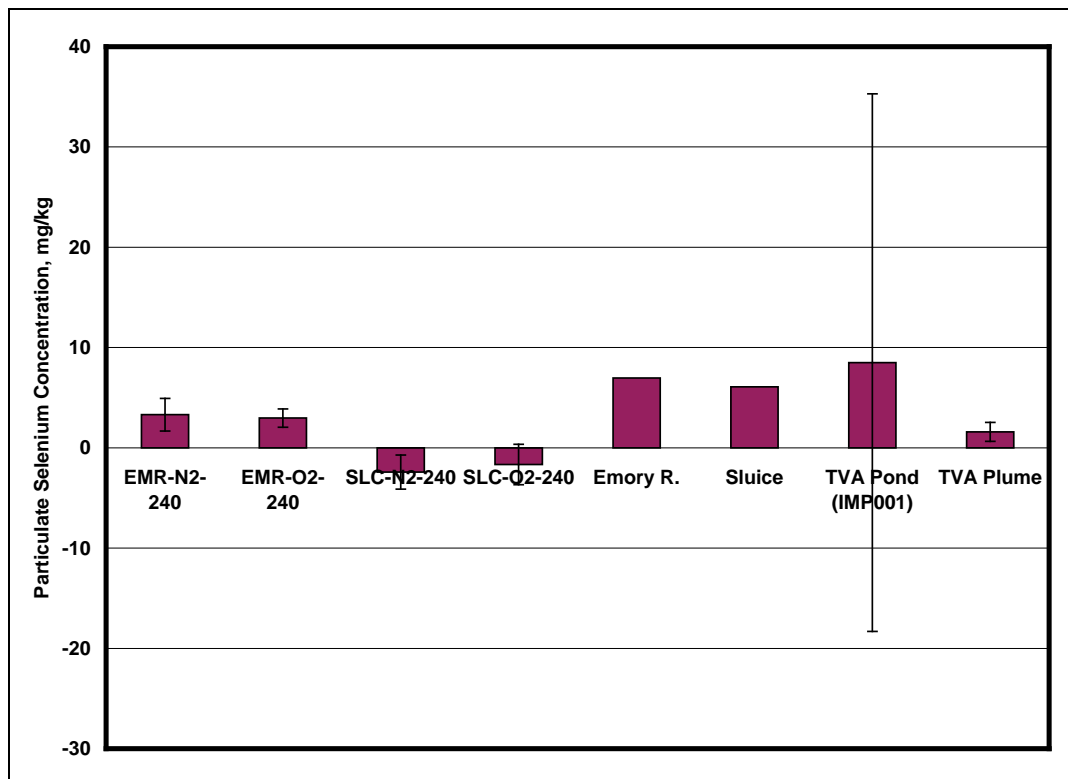


Figure 80. Particulate selenium concentrations (verified, not validated).

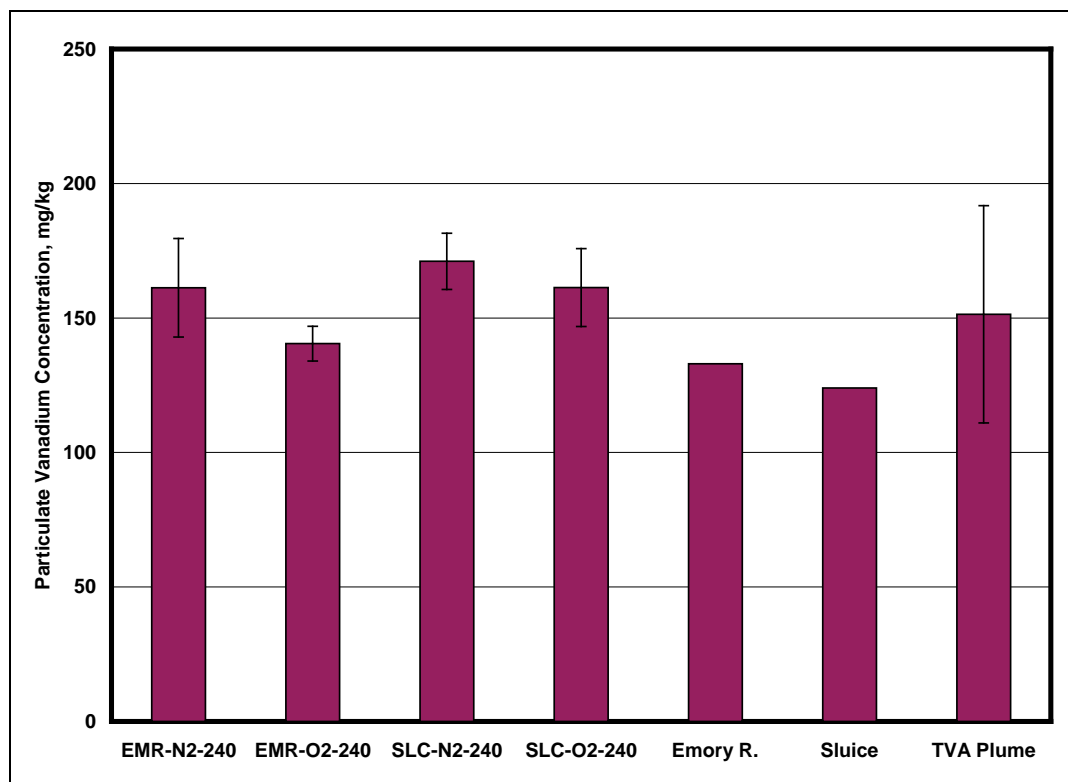


Figure 81. Particulate vanadium concentrations (verified, not validated).

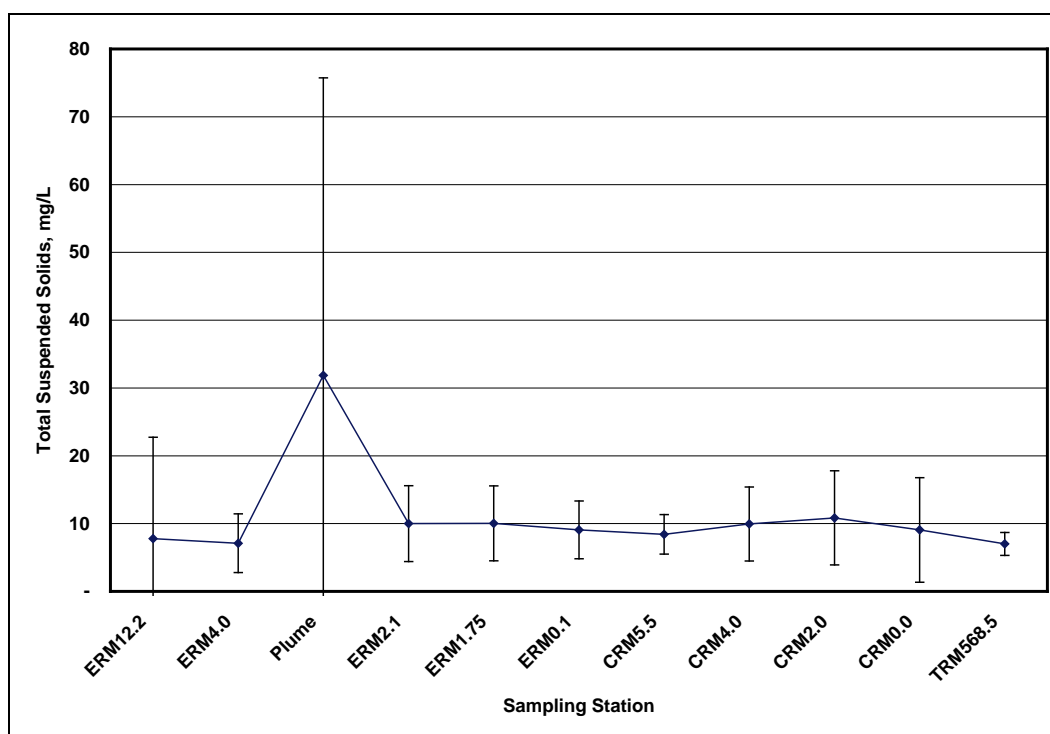


Figure 82. TVA field observations (verified, not validated) of TSS in receiving waters. Sampling stations on the x-axis are arranged upstream to downstream.

immediately to an average of 8 to 11 mg/L and remain in this range until mixing with the Tennessee River. The reduction is likely due to additional settling of the ash material resuspended by dredging, as well as by dispersion and dilution of the plume solids.

Figures 83 and 84 show the change in total and dissolved arsenic and barium in the river system upstream and downstream of the dredging activity. Selenium is not illustrated because all of the reported values downstream of the plume values are below TVA's detection limit of 0.002 mg/L. Arsenic concentrations return to near the reporting limit of 0.002 mg/L before the confluence of the Emory and Clinch Rivers. The barium concentration decreases at the next station downstream from the plume and continues to be relatively steady until the confluence of the Clinch and Tennessee Rivers. The Kingston Plant's condenser cooling water discharge enters the Clinch River between river mile 4.0 and 2.0 and may contribute to the slight bump in arsenic and barium shown on the charts. Figure 85 shows the arsenic and barium in the dissolved fraction (as percent of the total), as well as for the river stations upstream and downstream of dredging. Downstream of dredging, the arsenic and barium is more than 85 percent in the dissolved phase, and the suspended solids concentration

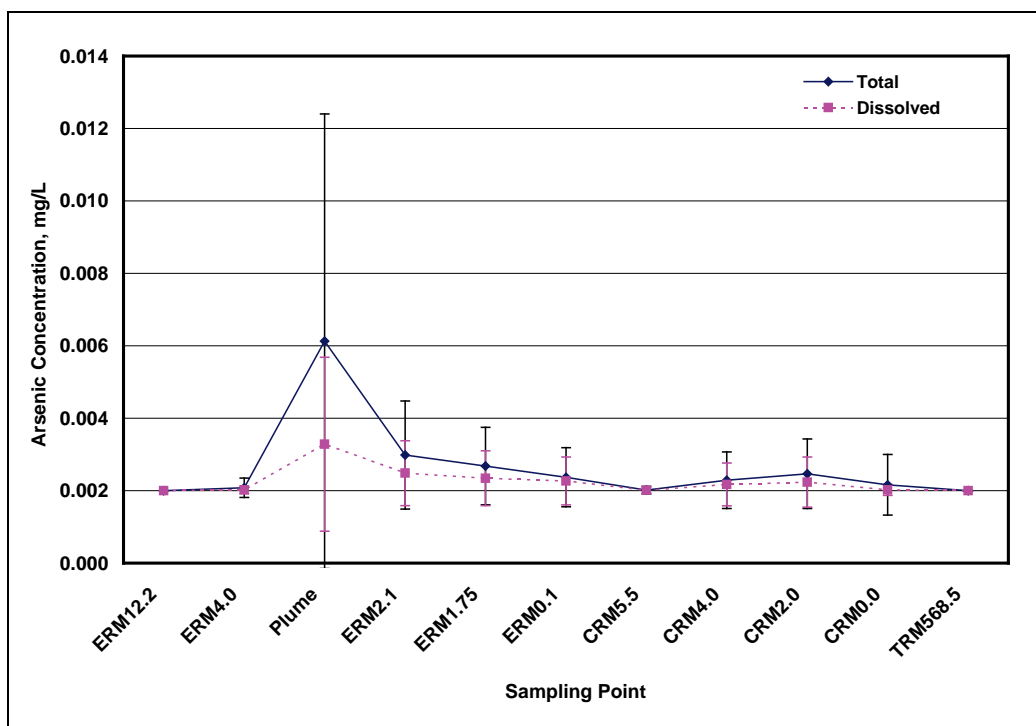


Figure 83. TVA field observations (verified, not validated) of arsenic in receiving waters. Sampling stations on the x-axis are arranged upstream to downstream.

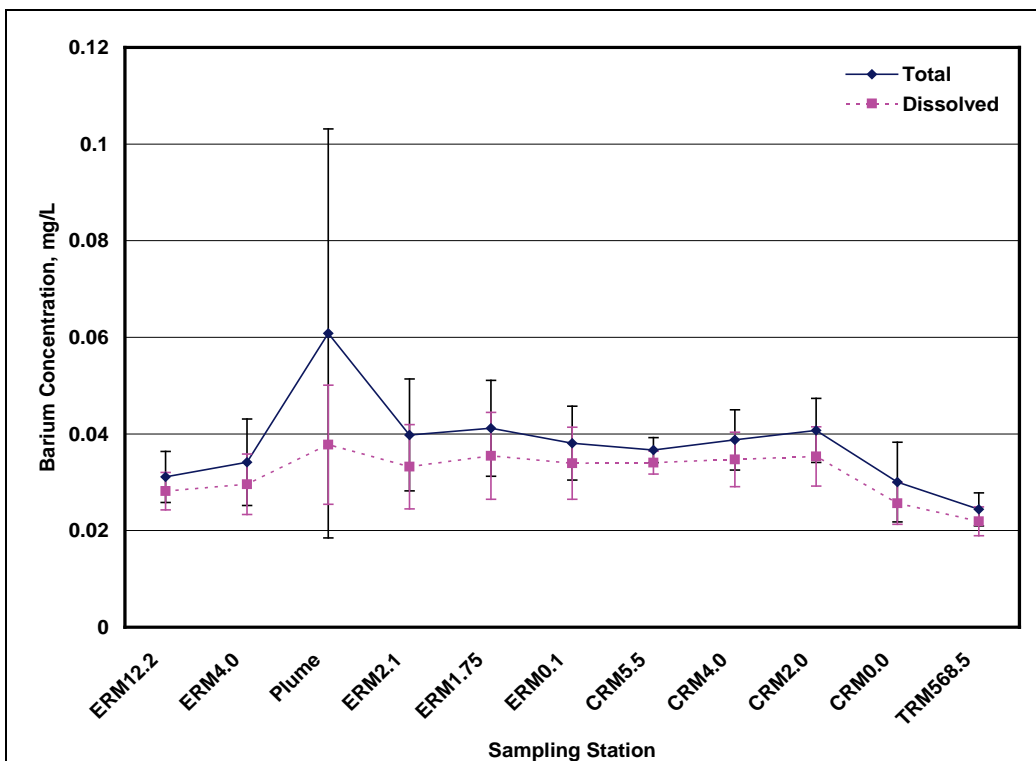


Figure 84. TVA field observations of barium in receiving waters. Sampling stations on the x axis are arranged upstream to downstream.

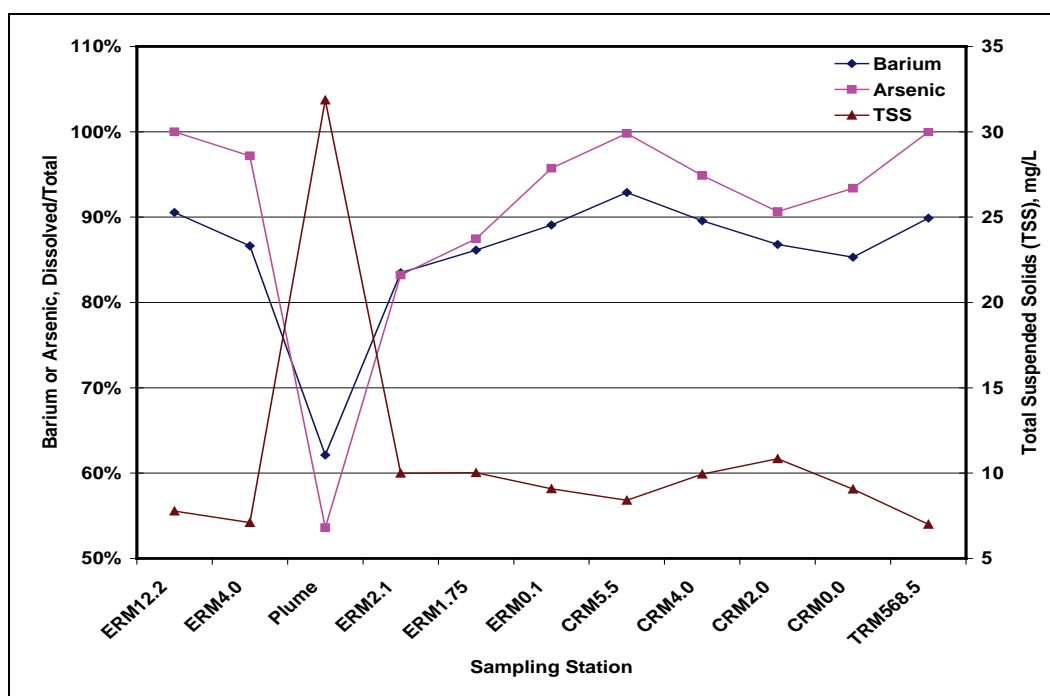


Figure 85. TVA field (verified, not validated) observations of the percent dissolved/total arsenic and barium compared to TSS in receiving waters. Sampling stations on the X-axis are arranged upstream to downstream.

is on the order of 10 mg/L. (This analysis could not be performed for selenium because most of the samples had less than detectable concentrations.) The dissolved metals are readily transportable downstream without adsorption to suspended particulate matter or bed material. Metals sorbed to suspended particulates represent a smaller fraction of the load and are subject to settling, further decreasing their contribution to the water column, or to desorption increasing the dissolved concentration in the water column.

Conclusions

The following conclusions can be drawn on the basis of this study:

- The elutriate experiments performed in this study used mixing times well beyond established elutriate procedures for the purpose of assessing potential shifts in metal speciation when fly ash contaminants are released to the water environment. The exaggerated terminal mixing times (10 days) produced elutriates that overestimate total dissolved metal concentrations for the dredge plume and the ash settling/stilling pond effluent based on comparison to those observed by TVA's field monitoring program for the plume and stilling pond.

- Suspended solids and metal concentrations decline significantly at the monitoring station immediately downstream of the dredging operation.
- Dissolved metals account for much of the total metal concentrations observed in the pond effluent, plume, and river monitoring stations, largely because of the relative low suspended solids concentration. This suggests that the small suspended particulate source limits further dissolved metal desorption in the water column, but that most of the metal constituents present in the water column are mobile and subject to downstream transport.
- Results of the field monitoring program should be closely observed for deviations from the trends observed to date. Increased dredge production rates may increase contaminant releases at the dredge, as well as increase flow rates through the settling ponds, reducing retention time and impacting the effectiveness of the settling pond system in retaining suspended solids and contaminants. Cumulative effects of dredging operations with time may also affect water quality through deposits of erodible solids downstream of the dredge and solids buildup in the settling ponds.

References

- Adams, W. A. Green, W. Ahlf, A. Burton, S. Brown, B. Chadwick, M. Crane, R. Gouguet, K. Ho, T. Reynoldson, J. Savitz, P. Sibley, A. Ringwood, C. Hogstrand. 2004. Using sediment assessment tools and a weight of evidence approach. In *Use of sediment quality guidelines and related tools for the assessment of contaminated sediments*, ed. R. J. Wenning, G. E. Bately, G. C. Ingersoll, and D. W. Moore, 163-226. Pensacola, FL: Society of Environmental Toxicology and Chemistry.
- Ahlers, J., C. Riedhammer, M. Vogliano, R-U. Ebert, R. Kühne, G. Schüürmann. 2006. Acute to chronic ratios in aquatic toxicity: Variation across trophic levels and relationship with chemical structure. *Environ Toxicol Chem.* 25: 2937-2945.
- American Public Health Association. 1999. *Standard methods for the examination of water and wastewater, 20th edition*. Alexandria, VA: Water Environmental Federation.
- Baral, A., R. Engel, W. Stephens, J. Farris, R. Hannigan. 2006. Evaluation of aquatic toxicities of chromium and chromium-containing effluents in reference to chromium electroplating industries. *Arch Environ Contam Toxicol.* 50: 496-502.
- Beckvar, N., T. M. Dillon, L. B. Read. 2005. Approaches for linking whole-body fish tissue residues of mercury or DDT to biological effects thresholds. *Environ Toxicol Chem.* 24: 2094-2105.
- Bednar, A. J., J. R. Garbarino, J. F. Ranville, T. R. Wildeman. 2002. Preservation of inorganic arsenic species in groundwater and acid mine drainage samples. *Environ Sci Technol.* 36: 2213-2216.
- Bednar, A.J., J. R. Garbarino, J. F. Ranville, T. R. Wildeman. 2003. Photodegradation of roxarsone in poultry litter leachates. *Sci Total Environ.* 302: 237-2.
- Bednar, A.J., J. R. Garbarino, J. F. Ranville, T. R. Wildeman. 2004. Methods of arsenic speciation and their application to natural water analysis. *Water Res.* 38(2): 355-364.
- Bednar, A.J., J. R. Garbarino, J. F. Ranville, T. R. Wildeman. 2005. Effects of iron on arsenic speciation and redox chemistry in acid mine water. *J Geochem Explo.* 85: 55-62.
- Bednar, A.J., R. A. Kirgan, W. T. Jones. 2009. Comparison of standard and reaction cell inductively coupled plasma mass spectrometry in the determination of chromium and selenium species by HPLC-ICP-MS. *Anal Chim Acta.* 632: 27-34.
- Bertram, P.E., A. S. Brooks. 1986. Kinetics of accumulation of selenium from food and water by fathead minnows. *Water Res.* 20(7): 877-884.
- Beusen, J. M., B. Neven. 1987. Toxicity of vanadium to different freshwater organisms. *Bull Environ Contam Toxicol* 39: 194-201.

- Call, D. J., L. T. Brooke, N. Ahmad, J. E. Richter. 1983. *Toxicity and metabolism studies with EPA priority pollutants and related chemicals in freshwater organisms*. EPA-600/3-83-095. Duluth, MN: US Environmental Protection Agency.
- Chassiagne, H., C. C. Chery, G. Gordin, F. Vanhaecke, and A. Rodriguez. 2004. 2-dimensional gel electrophoresis technique for yeast selenium-containing proteins - sample preparation and MS approaches for processing 2-D gel protein spots. *J Anal A Spectrom.* 19: 85-95.
- Crommentuijn, T., D. Sijm, J. de Bruijn, M. van den Hoop, K. van Leeuwen, E. van de Plassche. 2000. Maximum permissible and negligible concentrations for metals and metalloids in the Netherlands, taking into account background concentrations. *J Environ Mgmt.* 60: 121-143.
- Dixon, D. G., and J. B. Sprague. 1981. Acclimation-induced changes in toxicity of arsenic and cyanide to rainbow trout, *Salmo gairdneri* Richardson. *J Fish Biol.* 18: 579-589.
- Dobbs, M. G., D. S. Cherry, J. Cairns. 1996. Toxicity and Bioaccumulation of Selenium to a Three-Trophic Level Food Chain. *Environ Toxicol Chem.* 15: 340-347.
- Dube, M. G., L. D. MacLatchy, J. D. Kieffer, N. E. Glozier, J. M. Culp, and K. J. Cash. 2005. Effects of metal mining effluent on Atlantic salmon (*Salmo salar*) and slimy sculpin (*Cottus cognatus*): using artificial streams to assess existing effects and predict future consequences. *Sci Total Environ.* 343: 135-154.
- Farag, A. M., T. May, G. D. Marty, M. Easton, D. D. Harper, E. E. Little, and L. Cleveland. 2006. The effect of chronic exposure on the health of Chinook salmon (*Oncorhynchus tshawtscha*). *Aquat Toxicol.* 76: 246-257.
- Felt, D. R., A. J. Bednar, and T. Georgian. 2008. The effects of grinding methods on metals concentrations in soils. *Talanta* 77: 380-387.
- Friedmann, A. S., M. C. Watzin, T. Brinck-Johnsen, and J. C. Leiter. 1996. Low levels of dietary methylmercury inhibit growth and gonadal development in juvenile walleye (*Stizostedion vitreum*). *Aquat Toxicol.* 35: 265-278.
- Gendusa, T. C., and T. L. Beiting. 1992. External biomarkers to assess chromium toxicity in adult *Lepomis macrochirus*. *Bull Environ Contam Toxicol.* 48: 237-242.
- Giesy, P., and R. L. Graney. 1989. Recent developments in and intercomparisons of acute and chronic bioassays and bioindicators. *Hydrobiologia* 188/189: 21-60.
- Gilderhus, P. A. 1966. Some effects of sublethal concentrations of sodium arsenite on bluegills and the aquatic environment. *Trans Am Fish Soc.* 095: 289-296.
- Gustafsson, J. P. 2009. *Visual MINTEQ*. Release 2.61.
- Haratake, M., M. Hongoh, M. Ono, and M. Nakayama. 2009. Thiol-dependent membrane transport of selenium through an integral protein of the red blood cell membrane. *Inorg Chem.* 48: 7805-7811.

- Heger, W., S. J. Jung, S. Martin, and H. Peter. 1995. Acute and prolonged toxicity to aquatic organisms of new and existing chemicals and pesticides. *Hydrobiologia* 31: 2707 – 2726.
- Holdway, D. A., and J. B. Sprague. 1979. Chronic toxicity of vanadium to flagfish. *Water Res.* 13: 905-910.
- Holdway, D. A., J. B. Sprague, and J. G. Dick. 1983. Bioconcentration of vanadium in American flagfish over one reproductive cycle. *Water Res.* 17: 937-941.
- Huggins, F. E., C. L. Senior, P. Chu, K. Ladwig, and G. P. Huffman. 2007. Selenium and arsenic speciation in fly ash from full-scale coal-burning utility plants. *Environ Sci Technol.* 41: 3284-3289.
- Kamei-Ishikawa, N., K. Tagami, and S. Uchida. 2007. Sorption kinetics of selenium on humic acid. *J Radioanal Nuc Chem.* 274: 555-561.
- Khangarot, B. S., and P. K. Ray. 1989. Investigation of correlation between physicochemical properties of metals and their toxicity to the water flea *Daphnia magna* Straus. *Ecotoxicol Environ. Safety* 18: 109-120.
- Lange, R., T. H. Hutchinson, N. Scholz, and J. Solbe. 1998. Analysis of the ECETOC Aquatic Toxicity (EAT) database II—comparison of acute to chronic ratios for various aquatic organisms and chemical substances. *Chemosphere* 36: 115–127.
- LeBlanc, G. A. 1980. Acute toxicity of priority pollutants to water flea (*Daphnia magna*). *Bull Environ Contam Toxicol.* 24: 384-691.
- Leung, K. M. Y., D. Morritt, J. R. Wheeler, P. Whitehouse, N. Sorokin, R. Toy, M. Holt, and M. Crane. 2001. Can saltwater toxicity be predicted from freshwater data? *Mar Pollut Bull.* 42: 1007-1013.
- Luoma, S. N., and P. S. Rainbow. 2005. Why is metal bioaccumulation so variable? Biodynamics as a unifying concept. *Environ Sci Technol.* 39(7): 1921-1931.
- Manceau, A., M. A. Marcus, and N. Tamura. 2002. Quantitative speciation of heavy metals in soils and sediments by synchrotron X-ray techniques. In: *Applications of Synchrotron Radiation In Low-Temperature Geochemistry and Environmental Sciences*, 49(341-428).
- Mathangwane, B. T., M. A. Chappell, J. R. V. Pils, L. S. Sonon, and V. P. Evangelou. 2008. Dispersion potential of selected Iowa lake sediments as influenced by dissolved and solid-phase constituents. *Clean* 36: 201-208.
- McGeachy, S. M., and D. G. Dixon. 1990. Effect of temperature on the chronic toxicity of arsenate to rainbow trout (*Oncorhynchus mykiss*). *Can J Fish Aquat Sci.* 47: 2228-2234.
- Mount, D. I. 1977. An assessment of application factors in aquatic toxicology. In *Recent advances in fish toxicology. A symposium held in Corvallis, Oregon on January 13-14, 1977*. Corvallis, OR: Office of Research and Development, USEPA.
- National Academy of Sciences/National Academy of Engineering. 1973. Water Quality Criteria 1972. EPA Ecological Res. Ser EPA R3-73-033, Washington, D.C.

- Newville, M. 2001. IFEFFIT: interactive XAFS analysis and FEFF fitting. *J Synchrotr Radiat.* 8: 322-324.
- Norberg-King, T. 1989. An evaluation of the fathead minnow seven-day subchronic test for estimating chronic toxicity. *Environ Toxicol Chem* 8: 1075-1089.
- Ogle, R. S., and A. W. Knight. 1989. Effects of elevated foodborne selenium on growth and reproduction of the fathead minnow (*Pimephales promelas*). *Arch Environ Toxicol Chem.* 18: 795-803.
- Palermo, M. R., P. R. Schroeder, T. J. Estes, and N. R. Francingues. 2008. *Technical guidelines for environmental dredging of contaminated sediments*. ERDC/EL TR-08-29. Vicksburg, MS: U.S. Army Engineer Research and Development Center.
- Phillips, D. J. H., and P. S. Rainbow. 1989. Strategies of trace metal sequestration in aquatic organisms. *Mar Environ Res.* 28: 207-210.
- Ponce de Leon, C. A., K. DeNicola, M. M. Bayon, and J. A. Caruso. 2003. Sequential extractions of selenium soils from Stewart Lake: Total selenium and speciation measurements with ICP-MS detection. *J Environ Monit.* 5: 435-440.
- Poppe, L. J., A. H. Eliason, J. J. Fredericks, R. R. Rendigs, D. Blackwood, and C. F. Polloni. 2000. U.S. Geological Survey Open File Report 00-358 (USGS 2000). Chapter 1: Grain-Size Analysis of Marine Sediments: Methodology and Data Processing. <http://pubs.usgs.gov/of/2000/of00-358/text/chapter1.htm>
- Rael, R. M., and W. T. Frankenberger. 1995. Detection of selenomethionine in the fulvic fraction of seleiferous sediment. *Soil Biol Biochem.* 27: 241-242.
- Ressler, T. 1998. WinXAS: A program for X-ray absorption spectroscopy data analysis under MS-windows. *J Synchrotr Radiat.* 5:118-122.
- Roex, E. W. M., C. A. M. van Gestel, A. P. van Wezel, and N. M. van Straalen. 2000. Ratios between acute aquatic toxicity and effects on population growth rates in relation to toxicant mode of action. *Environ Toxicol Chem.* 19: 685 – 693.
- Roling, J. A., L. J. Bain, J. Gardea-Torresdey, J. Bader, and W. S. Baldwin. 2006. Hexavalent chromium reduces larval growth and alters gene expression in mummichog (*Fundulus heteroclitus*). *Environ Toxicol Chem.* 25:2725-2733.
- Schultz, R., and R. Hermautz. 1990. Transfer of toxic concentrations of selenium from parent to progeny in the fathead minnow (*Pimephales promelas*). *Bull Environ Toxicol Chem* 45: 568-573.
- Séby, F., M. P. Gautier, G. Lespés, and M. Astruc. 1997. Selenium speciation in soils after alkaline extraction. *Sci Total Environ.* 207: 81-90.
- Snarski, V. M., and G. F. Olson. 1982. Chronic toxicity and bioaccumulation of mercuric chloride in the fathead minnow (*Pimephales promelas*). *Aquat Toxicol.* 2: 143-156.

- Society of Environmental Toxicology and Chemistry (SETAC). 2008. Tissue residue approach for toxicity assessment: Invertebrates and fish. In *Proceedings Society of Environmental Toxicology and Chemistry, Leavenworth, WA, 7-12 June 2007*, published in 2009 by SETAC and CRC Press.
- Spehar, R. L., and J. T. Fiandt. 1986. Acute and chronic effects of water quality-based metal mixtures on three aquatic species. *Environ Toxicol Chem.* 5: 917-931.
- Steevens, J. A., M. Reiss, and A. V. Pawlisz. 2005. A methodology for deriving tissue residue benchmarks for fish exposed to 2,3,7,8-tetrachlorodibenzo-p-dioxin. *Integr Environ Assess Mgmt.* 1(2): 142-151.
- Tarze, A., M. Dauplais, I. Grigoras, M. Lazard, N-T. Ha-Duong, F. Barbier, S. Blanquet, and P. Plateau. 2007. Extracellular production of hydrogen selenide accounts for thiol-assisted toxicity of selenite against *Saccharomyces cerevisiae*. *J Biol Chem.* 282:8759-8767.
- Tessier, A., P. G. C. Campbell, and M. Bisson. 1979. Sequential extraction procedure for the speciation of particulate trace metals. *Anal Chem.* 51:844-850.
- U.S. Army Corps of Engineers (USACE). 2003. *Evaluation of dredged material proposed for disposal at island, nearshore, or upland confined disposal facilities - Testing Manual.* ERDC/EL TR-03-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.
- U.S. Army Engineer Research and Development Center (ERDC). 2009. *Quality Assurance Project Plan. Evaluation of Metals Release from Oxidation of Fly Ash during Dredging of the Emory River, TN.* June 14, 2009.
- U.S. Environmental Protection Agency (USEPA). 2002a. *Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms.* EPA/812/R/02/012. Washington, DC: U.S. Environmental Protection Agency, Office of Water.
- U.S. Environmental Protection Agency (USEPA). 2002b. *Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms, 4th edition.* EPA/821/R/02/013. Washington, DC: U.S. Environmental Protection Agency, Office of Water.
- U.S. Environmental Protection Agency (USEPA). 2002c. *National recommended water quality criteria.* EPA/822/R/02/047. Washington, DC: U.S. Environmental Protection Agency, Office of Water.
- U.S. Environmental Protection Agency (USEPA). 2004. *Draft aquatic life water quality criteria for selenium – 2004.* EPA-822-D-04-001. Washington, DC: U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology.
- U.S. Environmental Protection Agency (USEPA). 2007. *SW-846 Test Methods for Evaluating Solid Waste, Method 3050B, Method 6010C, Method 6020A.*
- U.S. Environmental Protection Agency (USEPA). 2009. *National Primary Drinking Water Regulations.* EPA816/F/09/004. Washington, DC: U.S. Environmental Protection Agency, Office of Water.

- U.S. Environmental Protection Agency (USEPA) Panel. 2009. *Review of potential selenium issues following a coal ash spill at the Tennessee Valley Authority Kingston Fossil Plant--An EPA Science Panel review paper*, prepared at the request of the Senate Committee on Environment and Public Works Staff, Washington, DC.
- U.S. Environmental Protection Agency/U.S. Army Corps of Engineers (USEPA/USACE). 1991. *Evaluation of dredged material proposed for ocean disposal*. EPA-503-8-91-001, Washington, DC.
- U.S. Environmental Protection Agency/U.S. Army Corps of Engineers (USEPA/USACE). 1998. *Evaluation of dredged material proposed for discharge in waters of the U.S. – Testing Manual*. EPA-823-B-98-004, Washington, DC.
- Verma, S. R., I. P. Tonk, and R. C. Dalela. 1981. Determination of the maximum acceptable toxicant concentration and the safe concentration for certain aquatic pollutants. *Acta Hydrochim Hydrobiol.* 9(3): 247-254.
- Vijver, M. G., C. A. M. Van Gestel, R. P. Lanno, N. M. Van Straalen, and W. J. G. M. Peijnenburg. 2004. Internal metal sequestration and its ecotoxicological relevance: a review. *Environ Sci Tech.* 38(18): 4705-4712.
- Voelker, B. M., F. M. M. Morel, and B. Sulzberger. 1997. Iron redox cycling in surface waters: Effects of humic substances and light. *Environ Sci Technol.* 31: 1004-1011.
- Webb, S. M. 2005. Sixpack: A graphical user interface for XAS analysis using IFEFFIT. *Physica Scripta* T115:1011-1014.
- Wheeler, J. R., K. M. Y. Leung, D. Morritt, N. Sorokin, H. Rogers, R. Toy, M. Holt, P. Whitehouse, and M. Crane. 2002. Freshwater to saltwater toxicity extrapolation using species sensitivity distributions. *Environ Toxicol Chem.* 21: 2459-2467.

Appendix A: Sample Collection Notes

Project: TUA Fly ash			Sampler Initials	Logger Initials
Crew: Barr / Stanley / Bednor			ATB	JKS
Station Identification: Fraser River Mouth J.E.S. 8-13-09	Site Location: EMR FA 00 A/B	Time (local): GPS Unit 1: N 35° 46.987 W 084° 31.511 GPS Unit 2:	Sampling Device: Shovel ^{pipette} J.E.S. 8-13-09	
Sediment collected for:			Sample Depth (cm): 0.25m 0.25m - 1.0m	
Organics	Site Parameters:		Composited (Y/N): J.E.S.	
Metals	Water depth:	0.6 m	# Replicates/Grabs: 3 J.E.S.	
Conventional	Secchi depth:		Sample Color: grey	
Biological testing	Temperature:		Sample Texture:	
Additional Comments: Sample slurries on disturbance immediately No mud / soil in sample. Ash only.	Salinity:	pH 6.96	Odor/sheens:	
	Conductivity:	120 μ S	Benthic Macroinvertebrates:	
	D.O. Eh	96.0		
① way point 19 ^{J.E.S.} N 35° 46.987 W 084° 31.511 (0945 time) ② " " 19 N 35° 54.877 W 084° 30.163 (Time 10:10) ③ WP 20 N 35° 54.855 W 084° 30.165 ④ WP 21 N 35° 54.858 W 084° 30.155 (Time 10:15)			Description (sand, silt, clay, etc.):	

Mark C.'s GPS

⑤ WP 22 N 35° 54.845

Way point did not take

W 084° 30.145

1 Time 10:40

Project: TVA Flyash			Sampler Initials	Logger Initials
Crew: Barr / Stanby / Clappell / Bedner			J.B. A.B.	XS
Station Identification: RFI WA CO ABCD	Site Location:	Time (local):	Sampling Device: water pump. water hose	
Sediment collected for:		GPS Unit 1:	Sample Depth (cm):	
		GPS Unit 2:		
Organics	Site Parameters:		Composited (Y/N):	
Metals	Water depth:		# Replicates/Grabs:	
Conventionals	Secchi depth:		Sample Color:	
Biological testing	Temperature:		Sample Texture:	
Additional Comments:	Salinity:		Odor/sheens:	
	Conductivity:		Benthic Macroinvertebrates:	
	D.O.:			
4 55 gal barrels of water. pump intake 25 ft. from shore. 5 ft. deep water @ intake. Intake hose about 2.5 ft. deep. Waypoint 20 @ edge of ramp. N 35° 55.995 W 084° 33.554 Pump/hoses flushed for 15 min prior to sampling.			Description (sand, silt, clay, etc.):	

Sampling Initiated at 12:30 p.m. 6-12-09

pH 6.81

EH 67.8 mV

Cond. 90 μ S

Project: TWA Flyash				Sampler Initials		Logger Initials	
Crew: Borri / Bednar				J.B.		TKS	
Station Identification:		Site Location:		Time (local):		Sampling Device: Teflon ^{3K5} Shave 1 HDPE	
RFI-SD-MTA				GPS Unit 1:			
Sediment collected for:		GPS Unit 2:		Sample Depth (cm):			
Organics		Site Parameters:		Composited (Y/N):			
Metals		Water depth:		# Replicates/Grabs:			
Conventionals		Secchi depth:		Sample Color:			
Biological testing		Temperature:		Sample Texture:			
Additional Comments:		Salinity:		Odor/sheens:			
		Conductivity:		Benthic Macroinvertebrates:			
		D.O.:					
6-12-09 1310 4 composited samples near water intake into hot water barrels depths 0.25 to 1.0 m N 35° 55.995 W 084° 33.554				Description (sand, silt, clay, etc.):			

Project: TWA Flyash			Sampler Initials	Logger Initials
Crew: Stanley / Barr			J.B.	J.S.
Station Identification: RF2 SDMT A	Site Location:	Time (local):	Sampling Device:	
Sediment collected for:		GPS Unit 1:		
			GPS Unit 2:	Sample Depth (cm):
Organics	Site Parameters:		Composited (Y/N):	
Metals	Water depth:		# Replicates/Grabs:	
Conventionals	Secchi depth:		Sample Color:	
Biological testing	Temperature:		Sample Texture:	
Additional Comments:	Salinity:		Odor/sheens:	
	Conductivity:		Benthic Macroinvertebrates:	
	D.O.:			
Waypoint 05 N ^{35 SCS} 36° 56.394 W 084 33.566 near RR tracks & road			Description (sand, silt, clay, etc.):	

Project: TWA Flyash			Sampler Initials	Logger Initials
Crew: Borr / Stanley			J.R.	JKS
Station Identification:	Site Location:	Time (local):	Sampling Device:	
RF3SDMTA		GPS Unit 1:	J.K.S. Teflon Shovel HDPE	
Sediment collected for:		GPS Unit 2:	Sample Depth (cm):	
			0.5 - 0.5 m	
Organics	Site Parameters:		Composited (Y/N):	
Metals	Water depth:		# Replicates/Grabs:	
Conventionals	Secchi depth:		Sample Color:	
Biological testing	Temperature:		Sample Texture:	
Additional Comments:	Salinity:		Odor/sheens:	
	Conductivity:		Benthic Macroinvertebrates:	
	D.O.:			
ref. Sediment up 26 N 35° 56.448 W 084° 33.793 250 m downstream of RR track crossing emery river			Description (sand, silt, clay, etc.):	

Cond. 90 μ S
 Eh -90.2
 pH 6.7

Time 1430

Project:		TVA Flyash		Sampler Initials	Logger Initials
Crew:		Chappell / Stanley		M.C.	JKS
Station Identification:	Site Location:	Time (local):	Sampling Device:		
RF- ^{Soil} Sediment JKS 4-SL-MTA		GPS Unit 1:	Soil corer		
Sediment collected for:		GPS Unit 2:	Sample Depth (cm):		
Organics	Site Parameters:		Composited (Y/N):		
Metals	Water depth:		# Replicates/Grabs: 3		
Conventionals	Secchi depth:		Sample Color:		
Biological testing	Temperature:		Sample Texture:		
Additional Comments:	Salinity:		Odor/sheens:		
	Conductivity:		Benthic Macroinvertebrates:		
	D.O.:		Description (sand, silt, clay, etc.):		
	6-12-09 WP did not sample Waypoint (WP#23) N 35° 56.009' W 084° 33.56 Waypoint ← N 35° 56.012 W 084° 33.571 Waypoint (WP#24) N 35° 56.001' W 084° 33.565				

WP's for 3 grabs that were composited
 on bank. Approx 50 yds. upstream of boat ramp
 where drums of water filled.

Rocks/Sticks removed from sample.
 >2mm

Project: TUA Flyash				Sampler Initials		Logger Initials	
Crew: Choppell / Bedner				M.C.I A.B		J.S.	
Station Identification: RF5 SMTA		Site Location:		Time (local):		Sampling Device: Soil corer	
				GPS Unit 1:			
Sediment collected for:		GPS Unit 2:		Sample Depth (cm): 1-2 ft.			
Organics		Site Parameters:		Composited (Y/N):			
Metals				# Replicates/Grabs:			
Conventional		Water depth:		Sample Color:			
Biological testing		Secchi depth:		Sample Texture:			
Additional Comments:		Temperature:		Odor/sheens:			
		Salinity:		Benthic Macroinvertebrates:			
		Conductivity:					
		D.O.:					
Waypoint 25 N 35° 56.394 W 084° 33.566 New RR tracks & road...						Description (sand, silt, clay, etc.):	

Project: TWA Flyash			Sampler Initials	Logger Initials
Crew: Bedner / Chapple			M.C.	J.K.S.
Station Identification: RF6 SLMTA	Site Location:	Time (local):	Sampling Device: Sediment corer	
		GPS Unit 1:		
Sediment collected for:		GPS Unit 2:	Sample Depth (cm): 0.25 - 0.5 m	
Organics	Site Parameters:		Composited (Y/N):	
Metals	Water depth:		# Replicates/Grabs: 3	
Conventionals	Secchi depth:		Sample Color:	
Biological testing	Temperature:		Sample Texture:	
Additional Comments: ref - Soil WP 26 W 35° 56.448 W 084° 33.793 250 m downstream of RR track crossing Emory River	Salinity:		Odor/sheens:	
	Conductivity:		Benthic Macroinvertebrates:	
	D.O.:			
			Description (sand, silt, clay, etc.):	

Time 1430

Project: TUA Flyash				Sampler Initials		Logger Initials	
Crew: Bedner / Stanley				JKS		JKS	
Station Identification:		Site Location:		Time (local):		Sampling Device:	
SLC WA 00 A-H				1545		Pump & hose	
Sediment collected for:				GPS Unit 1:		Sample Depth (cm):	
				GPS Unit 2:		0.5 m	
Organics		Site Parameters:		Composited (Y/N):			
Metals		Water depth:		# Replicates/Grabs:			
Conventional		Secchi depth:		Sample Color:			
Biological testing		Temperature:		Sample Texture:			
Additional Comments:		Salinity:		Odor/sheens:			
		Conductivity:		Benthic Macroinvertebrates:			
		D.O.:					
SLC WA 00 A, B, C, D, E, & H N 35° 54.192' W.P. 1 W 084° 31.016' in Al's GPS. Taken @ Bendin Sluice channel. Lots of Suspended Ash				Description (sand, silt, clay, etc.):			

EH -65 mV

PH 7.95

@ discharge

Project: TUA Flyash			Sampler Initials	Logger Initials
Crew: Bedner / Stanley			AJB.	J.K.S.
Station Identification: SCCFA00A	Site Location:	Time (local):	Sampling Device:	
		GPS Unit 1:		
Sediment collected for:		GPS Unit 2:	Sample Depth (cm):	
Organics	Site Parameters:		Composited (Y/N):	
Metals	Water depth:		# Replicates/Grabs:	
Conventionals	Secchi depth:		Sample Color:	
Biological testing	Temperature:		Sample Texture:	
Additional Comments:	Salinity:		Odor/sheens:	
	Conductivity:		Benthic Macroinvertebrates:	
	D.O.:			
Take @ 1610 6-0-09 SCCFA00A 5 gal bucket of sed from bend @ strike channel			Description (sand, silt, clay, etc.):	

Sample taken by ^{excavator} back hoe.
 Too deep to wade
 W.P. 7 on AI's GPS

N 35° 54.192
 W 084° 31.020'

Project: TWA Fly ash			Sampler Initials	Logger Initials
Crew: M. Chappell			M.C.	M.C.
Station Identification: Silt/Weir Gravel Discharge	Site Location: EFLWMTA	Time (local): 1600	Sampling Device: by bottle @ Weir	
Sediment collected for:	EFLWMTA	GPS Unit 1: 24 (Mack's) GPS Unit 2:	Sample Depth (cm):	
Organics	Site Parameters:		Composited (Y/N):	
Metals	Water depth:		# Replicates/Grabs:	
Conventionals	Secchi depth:		Sample Color:	
Biological testing	Temperature:		Sample Texture:	
Additional Comments:	Salinity:		Odor/sheens:	
	Conductivity:		Benthic Macroinvertebrates:	
	D.O.:			
<p> $pH = 8.59$ $th = -187.1$ $EC = 300 \mu S/cm$ $N \ 35^{\circ} 54.279'$ $W \ 087^{\circ} 30.363'$ </p>			Description (sand, silt, clay, etc.):	

Project: TUA Flyash			Sampler Initials	Logger Initials
Crew: Chappell			M.C	J.K.S
Station Identification:	Site Location:	Time (local): 1645 1653	Sampling Device: Soil Core	
Sediment collected for:		GPS Unit 1:	Sample Depth (cm): 0.25 - 0.5 m	
		GPS Unit 2:		
Organics	Site Parameters:		Composited (Y/N):	
Metals	Water depth:		# Replicates/Grabs:	
Conventionals	Secchi depth:		Sample Color:	
Biological testing	Temperature:		Sample Texture:	
Additional Comments:	Salinity:		Odor/sheens:	
	Conductivity:		Benthic Macroinvertebrates:	
	D.O.:			
N 35° 54.550 Waypoints 28, 29, 30 Mark's GPS W 084° 30.710 > 28 N 35° 54.586' > 29 W 084° 30.769' > 29 N 35° 54.604 > 30 W 084° 30.811 > 30			Description (sand, silt, clay, etc.):	

PIL FA MT A
 PIL FA GT A
 PIL FA GT B
 6-12-09 16:53

sample I.D.s

Appendix B: Elutriate Laboratory Data Sheets

T=0

Elutriate Water Record Sheet					
Project:	TVA Kingston Fly Ash				
Site ID:	Emory River and Kingston Sluice Channel				
Date:	6/13/09				
Time:	9:54 am started prepung Elutriates				
Sample	Replicate	Temperature (Deg C)	pH (SU)	Eh (mV)	Notes
EMR-EL-O2	A	20-21	5.96664	72.4	
	B	20	6.73	70.2	
	C	20	6.78	69.9	
EMR-EL-N2	A	18-19	6.89	67.064.6	
	B	19	6.84	62.7	
	C	20	6.86	63.3	
SLC-EL-O2	A	18-19	7.76	52.4	
	B	19	7.67	52.3	
	C	18	7.65	51.9	
SLC-EL-N2	A	19	7.83	53.2	
	B	19	7.83	54.4	
	C	18-19	7.86	56.5	
Initials:		JS	JS	JS	
Date:		6/13	6/13	6/13	
Time:		12:55	12:55	12:55	
Initials (QA):		AJD	AJR	AJD	

For preparation of elutriates used RFI-WA-00-A and RFI-WA-00-D for EMR elutriates.

For preparation of SLC elutriates use SLC-WA-00-E

SLC-WA-00-F

SLC-WA-00-C

SLC-WA-00-D - ~~JS~~

SLC-WA-00-G partially used JS

TSS of SLC-WA was 0.6 g/L, 9.4 g/L SLC-FA added to bring it up to 10 g/L wt/wt
 T₀ started at 1300, beakers containing FA mixed into chambers & chambers aerated.

t = 1

Elutriate Water Record Sheet					
Project: TVA Kingston Fly Ash					
Site ID: Emory River and Kingston Sluice Channel					
Date: 6/13/09 JR.					
Time: 14:05					
Sample	Replicate	Temperature (Deg C)	pH (SU)	Eh (mV)	Notes
EMR-EL-O2	A	20°C	7.09	30.7	X
	B	20	7.16	29.7	
	C	20	7.32	28.6	
EMR-EL-N2	A	WS 19 20	7.49	24.0	
	B	6/13 19	7.42	24.6	
	C	20	7.40	26.2	
SLC-EL-O2	A	19	7.62	24.7	
	B	19	7.64	24.4	
	C	19	7.70	24.6	
SLC-EL-N2	A	19	7.81	22.7	
	B	19	7.80	22.3	
	C	19	7.83	21.4	
Initials:		WS	WS	WS	
Date:		6/13/09	6/13/09	6/13/09	
Time:		14:05	14:05	14:05	
Initials (QA):		ASD	ASD	ASD	

200

t = 24

Elutriate Water Record Sheet						
Project: TVA KINGSTON FLY ASH						
Site ID: EMORY RIVER AND KINGSTON RIVER SLUICE CHANNEL						
Date: 6/14/2009						
Time: 13:00						
Sample	Replicate	Temperature (Deg C)	pH (SU)	Eh (mV)	Notes	
EMR-EL-O2	A	19-20	7.12	-21.5		
	B	19-20	7.21	-29.9		
	C	19-20	7.30	-22.6		
EMR-EL-N2	A	19-20	7.45	-30.2		
	B	19-20	7.54	-32.0		
	C	19-20	7.55	-33.0		
SLC-EL-O2	A	19-20	7.84	-35.0		
	B	19-20	7.85	-34.7		
	C	19-20	7.83	-34.4		
SLC-EL-N2	A	19-20	7.99	-39.6		
	B	19-20	7.89	-39.0		
	C	19-20	7.91	-36.5		
Initials:		WTS	WTS	WTS		
Date:		6/14/09	6/14/09	6/14/09		
Time:		13:00	13:00	13:00		
Initials (QA):		ASD	ASD	ASD		

STIRRED ELUTRIATES WITH GLASS RODS BEFORE SAMPLE COLLECTION. WTS

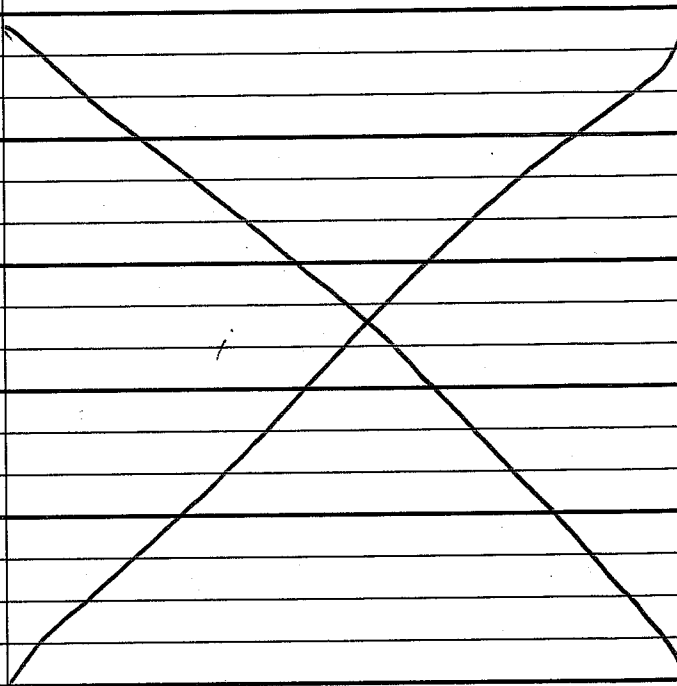
t = 48

Elutriate Water Record Sheet					
Project: TRA KINGSTON FIY ASH					
Site ID: EMORY RIVER & KINGSTON SLUICE CHANNELL					
Date: 6/15/09					
Time: 13:00					
Sample	Replicate	Temperature (Deg C)	pH (SU)	Eh (mV)	Notes
EMR-EL-O2	A	19	7.13	36	
	B	19	7.32	36.2	
	C	19	7.34	36.1	
EMR-EL-N2	A	19	7.47	25.6	
	B	19	7.46	25.0	
	C	19	7.48	24.8	
SLC-EL-O2	A	19	7.71	27.0	
	B	19	7.73	27.0	
	C	19	7.73	26.8	
SLC-EL-N2	A	19	7.87	22.6	
	B	19	7.86	22.5	
	C	19	7.86	22.2	
Initials:		AIR	AIR	AIR	
Date:		6/15/09	6/15/09	6/15/09	
Time:		13:00	13:00	13:00	
Initials (QA):		WTJ	WTJ	WTJ	

STIRRED ELUTRIATES W/ GLASS RODS. EMR IS SETTLING A BK.

WTJ

t = 96

Elutriate Water Record Sheet					
Project: TVA KINGSTON FLY ASH					
Site ID: EMORY RIVER & KINGSTON SLUICE CHANNEL					
Date: 6/17/2009					
Time: 13:00					
Sample	Replicate	Temperature (Deg C)	pH (SU)	Eh (mV)	Notes
EMR-EL-O2	A	19	7.65	68.4	
	B	19	7.66	68.1	
	C	19	7.63	68.3	
EMR-EL-N2	A	19	7.71	64.7	
	B	19	7.70	64.6	
	C	19	7.71	64.0	
SLC-EL-O2	A	19	7.90	61.3	
	B	19	7.92	61.4	
	C	19	7.94	61.1	
SLC-EL-N2	A	19	8.06	58.7	
	B	19	8.07	58.6	
	C	19	8.10	58.2	
Initials:		EC	EC	EC	
Date:		6/17/2009	6/17/2009	6/17/2009	
Time:		13:00	13:00	13:00	
Initials (QA):		WTS	WTS	WTS	

WTS

BEFORE SAMPLING STIRRED ELUTRIATES WITH METAL ROD TO RE-SUSPEND SEDIMENT THAT HAD SETTLED ON THE BOTTOM OF BARRELS AND BUCKETS

6 = 240 hrs.

Elutriate Water Record Sheet						
Project: TVA KINGSTON FLY ASH						
Site ID: EMORY RIVER & KINGSTON SLUICE CHANNEL						
Date: 6/23/2009						
Time: 13:00						
Sample	Replicate	Temperature (Deg C)	pH (SU)	Eh (mV)	Notes	
EMR-EL-O2	A	19	8.64	91.2		
	B	19	8.64	91.6		
	C	19	8.63	92.0		
EMR-EL-N2	A	19	9.00	87.6		
	B	19	8.99	87.8		
	C	19	9.00	87.6		
SLC-EL-O2	A	19	8.91	87.9		
	B	19	8.93	87.8		
	C	19	8.94	87.3		
SLC-EL-N2	A	19	9.41	78.9		
	B	19	9.35	79.1		
	C	19	9.33	78.9		
Initials:		WTJ	WTJ	WTJ		
Date:		6/23/09	6/23/09	6/23/09		
Time:		13:00	13:00	13:00		
Initials (QA):		PRW	PRW	PRW		

ELUTRIATES WERE STIRRED MORNING, SAMPLE WAS TAKEN. WTJ

Appendix C: Particle Size Distribution

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

File name:	SLC-O2				
File ID:	TVA KINGSTON				
Volume %	SLC-O2-001	SLC-O2-024	SLC-O2-048	SLC-O2-096	SLC-O2-240
	Particle Diameter	Particle Diameter	Particle Diameter	Particle Diameter	Particle Diameter
	um <	um <	um <	um <	um <
10	0.920	0.985	1.096	0.865	0.899
25	1.670	1.917	2.071	1.514	1.604
50	3.011	3.576	4.011	2.662	2.885
75	4.956	6.681	23.777	4.139	4.630
90	8.136	49.901	60.430	5.634	6.633
	SLC-O2-001	SLC-O2-024	SLC-O2-048	SLC-O2-096	SLC-O2-240
Channel Diameter (Lower) um	Cum. < Volume %	Cum. < Volume %	Cum. < Volume %	Cum. < Volume %	Cum. < Volume %
0.3752	-	-	-	-	-
0.4119	0.230	0.211	0.165	0.260	0.237
0.4521	0.636	0.583	0.456	0.719	0.657
0.4964	1.228	1.125	0.881	1.390	1.271
0.5449	2.066	1.887	1.483	2.339	2.140
0.5981	3.108	2.828	2.233	3.519	3.223
0.6566	4.323	3.916	3.111	4.897	4.493
0.7208	5.697	5.132	4.108	6.455	5.932
0.7913	7.227	6.470	5.225	8.194	7.542
0.8686	8.901	7.915	6.456	10.099	9.309
0.9536	10.708	9.449	7.795	12.156	11.222
1.0468	12.644	11.068	9.247	14.364	13.278
1.1491	14.722	12.780	10.822	16.736	15.487
1.2614	16.968	14.609	12.544	19.303	17.873
1.3848	19.406	16.580	14.433	22.093	20.458
1.5201	22.066	18.722	16.512	25.134	23.266
1.6688	24.973	21.066	18.801	28.456	26.322

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Statistics
(Analysis by Coulter Counter)

Volume Statistics (Arithmetic)									
Calculations from 0.375 µm to 948 µm									
	Mean	Median	D(p,q)	S.D.	Mode	S.S.A.	d10	d50	d90
	µm	µm	µm	µm	µm	cm²/mL	µm	µm	µm
SLC-O2-001.\$av	5.66	3.01	0.682	9.49	3.36	28821	0.92	3.01	8.14
SLC-O2-024.\$av	13.4	3.58	0.672	23.1	3.69	24985	0.985	3.58	49.9
SLC-O2-048.\$av	17.1	4.01	0.691	25.1	3.36	22221	1.1	4.01	60.4
SLC-O2-096.\$av	2.99	2.66	0.683	1.83	3.36	32134	0.865	2.66	5.63
SLC-O2-240.\$av	3.55	2.88	0.684	2.88	3.69	30178	0.899	2.88	6.63
(Average)	8.53	3.23	0.68	12.50	3.49	27,668.00	0.95	3.23	26.10
(C.V.)	74.10%	17.10%	1.00%	88.30%	5.20%	14.50%	9.60%	17.10%	102.40%
(Maximum)	17.1	4.01	0.691	25.1	3.69	32134	1.1	4.01	60.4
(Minimum)	2.99	2.66	0.672	1.83	3.36	22221	0.865	2.66	5.63

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Statistics
(Analysis by Coulter Counter)

Volume Statistics (Arithmetic)									
Calculations from 0.375 µm to 948 µm									
	Mean	Median	D(p,q)	S.D.	Mode	S.S.A.	d10	d50	d90
	µm	µm	µm	µm	µm	cm ² /mL	µm	µm	µm
EMR-O2-0	3.59	2.94	0.687	2.82	3.69	29480	0.926	2.94	6.7
EMR-O2-0	3.63	2.76	0.705	3.23	3.06	30214	0.925	2.76	6.92
EMR-O2-0	4.1	2.93	0.699	4.04	3.36	29284	0.925	2.93	8.11
EMR-O2-0	3.46	2.95	0.674	2.52	3.69	30037	0.893	2.95	6.45
EMR-O2-2	3.86	3.16	0.672	3.09	4.05	28902	0.904	3.16	7.31
(Average)	3.73	2.95	0.687	3.14	3.57	29584	0.915	2.95	7.1
(C.V.)	6.70%	4.80%	2.10%	18.10%	10.50%	1.80%	1.70%	4.80%	9.20%
(Maximum)	4.1	3.16	0.705	4.04	4.05	30214	0.926	3.16	8.11
(Minimum)	3.46	2.76	0.672	2.52	3.06	28902	0.893	2.76	6.45

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Statistics
(Analysis by Coulter Counter)

Volume Statistics (Arithmetic)									
Calculations from 0.375 µm to 948 µm									
	Mean	Median	D(p,q)	S.D.	Mode	S.S.A.	d10	d50	d90
	µm	µm	µm	µm	µm	cm²/mL	µm	µm	µm
SLC-N2-0	4.31	2.91	0.685	5.96	3.36	29703	0.908	2.91	7.08
SLC-N2-0	4.33	2.89	0.68	6.75	3.69	30115	0.898	2.89	6.37
SLC-N2-0	7.03	3.26	0.689	11.1	3.36	26644	0.983	3.26	18.6
SLC-N2-0	2.98	2.66	0.681	1.81	3.36	32124	0.865	2.66	5.6
SLC-N2-2	3.49	2.8	0.684	3.27	3.36	30713	0.891	2.8	6.39
(Average)	4.43	2.9	0.684	5.77	3.42	29860	0.909	2.9	8.81
(C.V.)	35.30%	7.60%	0.50%	62.00%	4.30%	6.80%	4.90%	7.60%	62.50%
(Maximum)	7.03	3.26	0.689	11.1	3.69	32124	0.983	3.26	18.6
(Minimum)	2.98	2.66	0.68	1.81	3.36	26644	0.865	2.66	5.6

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Statistics
(Analysis by Coulter Counter)

Volume Statistics (Arithmetic)									
Calculations from 0.375 µm to 948 µm									
	Mean	Median	D(p,q)	S.D.	Mode	S.S.A.	d10	d50	d90
	µm	µm	µm	µm	µm	cm ² /mL	µm	µm	µm
EMR-N2-001.\$av	3.87	3.03	0.681	3.34	3.69	29080	0.919	3.03	7.36
EMR-N2-024.\$av	3.43	2.77	0.692	2.68	3.36	30634	0.903	2.77	6.51
EMR-N2-048.\$av	3.53	2.73	0.697	3	3.06	30738	0.902	2.73	6.74
EMR-N2-096.\$av	3.56	3.03	0.668	2.63	4.05	29881	0.88	3.03	6.66
EMR-N2-240.\$av	4.22	3.23	0.676	3.83	4.05	28239	0.92	3.23	8.22
(Average)	3.72	2.96	0.683	3.1	3.64	29714	0.905	2.96	7.1
(C.V.)	8.70%	7.00%	1.70%	16.20%	11.90%	3.60%	1.80%	7.00%	10.00%
(Maximum)	4.22	3.23	0.697	3.83	4.05	30738	0.92	3.23	8.22
(Minimum)	3.43	2.73	0.668	2.63	3.06	28239	0.88	2.73	6.51

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

	SLC-O2-001	SLC-O2-024	SLC-O2-048	SLC-O2-096	SLC-O2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
1.8319	28.158	23.649	21.320	32.091	29.653
2.0110	31.642	26.503	24.083	36.063	33.278
2.2076	35.436	29.648	27.091	40.381	37.206
2.4234	39.532	33.091	30.330	45.026	41.429
2.6603	43.900	36.816	33.773	49.960	45.923
2.9204	48.493	40.791	37.377	55.129	50.646
3.2059	53.249	44.969	41.088	60.459	55.541
3.5193	58.093	49.286	44.845	65.858	60.538
3.8634	62.936	53.657	48.579	71.216	65.559
4.2411	67.680	57.985	52.217	76.411	70.512
4.6557	72.216	62.163	55.683	81.324	75.294
5.1109	76.440	66.084	58.903	85.840	79.797
5.6105	80.258	69.648	61.807	89.855	83.918
6.1590	83.588	72.762	64.338	93.265	87.566
6.7611	86.357	75.342	66.446	95.981	90.661
7.4221	88.507	77.328	68.098	97.960	93.135
8.1477	90.024	78.701	69.288	99.190	94.948
8.9443	90.960	79.489	70.062	99.780	96.124
9.8187	91.468	79.827	70.538	99.967	96.809
10.7790	91.745	79.923	70.863	99.998	97.211
11.8320	91.948	79.948	71.178	100.000	97.521
12.9890	92.177	79.977	71.595	100.000	97.863
14.2590	92.496	80.068	72.171	100.000	98.299
15.6530	92.926	80.277	72.863	100.000	98.802
17.1830	93.428	80.602	73.546	100.000	99.285
18.8630	93.940	80.985	74.103	100.000	99.662
20.7070	94.362	81.357	74.510	100.000	99.885
22.7320	94.624	81.674	74.832	100.000	99.979
24.9540	94.741	81.939	75.190	100.000	99.998
27.3930	94.799	82.199	75.738	100.000	100.000
30.0710	94.879	82.560	76.612	100.000	100.000
33.0110	95.105	83.180	77.864	100.000	100.000

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

	SLC-O2-001	SLC-O2-024	SLC-O2-048	SLC-O2-096	SLC-O2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
36.2390	95.639	84.213	79.445	100.000	100.000
39.7810	96.524	85.679	81.241	100.000	100.000
43.6700	97.602	87.420	83.137	100.000	100.000
47.9400	98.676	89.264	85.063	100.000	100.000
52.6260	99.466	91.023	87.010	100.000	100.000
57.7710	99.887	92.617	89.013	100.000	100.000
63.4190	99.989	94.016	91.109	100.000	100.000
69.6190	100.000	95.291	93.277	100.000	100.000
76.4250	100.000	96.458	95.404	100.000	100.000
83.8970	100.000	97.499	97.295	100.000	100.000
92.0990	100.000	98.389	98.722	100.000	100.000
101.1000	100.000	99.097	99.560	100.000	100.000
110.9900	100.000	99.590	99.904	100.000	100.000
121.8400	100.000	99.864	99.989	100.000	100.000
133.7500	100.000	99.971	100.000	100.000	100.000
146.8200	100.000	99.997	100.000	100.000	100.000
161.1800	100.000	100.000	100.000	100.000	100.000
176.9300	100.000	100.000	100.000	100.000	100.000
194.2300	100.000	100.000	100.000	100.000	100.000
213.2200	100.000	100.000	100.000	100.000	100.000
234.0700	100.000	100.000	100.000	100.000	100.000
256.9500	100.000	100.000	100.000	100.000	100.000
282.0700	100.000	100.000	100.000	100.000	100.000
309.6400	100.000	100.000	100.000	100.000	100.000
339.9200	100.000	100.000	100.000	100.000	100.000
373.1500	100.000	100.000	100.000	100.000	100.000
409.6300	100.000	100.000	100.000	100.000	100.000
449.6700	100.000	100.000	100.000	100.000	100.000
493.6300	100.000	100.000	100.000	100.000	100.000
541.8900	100.000	100.000	100.000	100.000	100.000
594.8700	100.000	100.000	100.000	100.000	100.000
653.0200	100.000	100.000	100.000	100.000	100.000

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

	SLC-O2-001	SLC-O2-024	SLC-O2-048	SLC-O2-096	SLC-O2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
716.8700	100.000	100.000	100.000	100.000	100.000
786.9500	100.000	100.000	100.000	100.000	100.000
863.8800	100.000	100.000	100.000	100.000	100.000
948.3400	100.000	100.000	100.000	100.000	100.000

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

File name:	SLC-N2				
File ID:	TVA KINGSTON				
Volume %	SLC-N2-001	SLC-N2-024	SLC-N2-048	SLC-N2-096	SLC-N2-240
	Particle	Particle	Particle	Particle	Particle
	Diameter	Diameter	Diameter	Diameter	Diameter
	um <	um <	um <	um <	um <
10	0.908	0.898	0.983	0.865	0.891
25	1.624	1.629	1.800	1.521	1.581
50	2.912	2.886	3.257	2.662	2.801
75	4.724	4.519	5.653	4.123	4.473
90	7.084	6.369	18.630	5.599	6.386
	SLC-N2-01	SLC-N2-024	SLC-N2-048	SLC-N2-096	SLC-N2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
0.3752	-	-	-	-	-
0.4119	0.234	0.245	0.201	0.263	0.245
0.4521	0.646	0.678	0.555	0.726	0.678
0.4964	1.249	1.309	1.073	1.402	1.309
0.5449	2.103	2.199	1.806	2.357	2.201
0.5981	3.167	3.301	2.718	3.542	3.309
0.6566	4.412	4.583	3.786	4.921	4.604
0.7208	5.823	6.023	4.997	6.475	6.067
0.7913	7.400	7.620	6.350	8.203	7.699
0.8686	9.131	9.357	7.840	10.092	9.488
0.9536	11.006	11.221	9.457	12.127	11.422
1.0468	13.022	13.207	11.204	14.307	13.502
1.1491	15.192	15.329	13.093	16.648	15.741
1.2614	17.540	17.617	15.152	19.184	18.171
1.3848	20.091	20.102	17.406	21.949	20.818
1.5201	22.870	22.818	19.880	24.973	23.712
1.6688	25.904	25.800	22.601	28.287	26.881

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

	SLC-N2-01	SLC-N2-024	SLC-N2-048	SLC-N2-096	SLC-N2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
1.8319	29.219	29.087	25.594	31.928	30.351
2.0110	32.832	32.712	28.878	35.921	34.142
2.2076	36.753	36.695	32.459	40.274	38.257
2.4234	40.970	41.034	36.325	44.968	42.677
2.6603	45.454	45.702	40.445	49.957	47.362
2.9204	50.156	50.654	44.775	55.182	52.256
3.2059	55.012	55.821	49.255	60.564	57.287
3.5193	59.950	61.119	53.812	66.012	62.375
3.8634	64.885	66.440	58.367	71.410	67.433
4.2411	69.721	71.662	62.831	76.634	72.364
4.6557	74.350	76.650	67.109	81.563	77.069
5.1109	78.670	81.276	71.111	86.083	81.450
5.6105	82.586	85.424	74.754	90.095	85.421
6.1590	86.020	88.992	77.963	93.495	88.901
6.7611	88.897	91.888	80.674	96.190	91.816
7.4221	91.157	94.050	82.840	98.125	94.102
8.1477	92.781	95.465	84.449	99.290	95.733
8.9443	93.815	96.185	85.549	99.822	96.763
9.8187	94.434	96.437	86.260	99.976	97.347
10.7790	94.827	96.482	86.740	99.999	97.683
11.8320	95.167	96.485	87.133	100.000	97.937
12.9890	95.546	96.485	87.551	100.000	98.202
14.2590	96.001	96.485	88.060	100.000	98.520
15.6530	96.507	96.485	88.679	100.000	98.870
17.1830	97.002	96.485	89.377	100.000	99.195
18.8630	97.418	96.485	90.100	100.000	99.452
20.7070	97.677	96.485	90.799	100.000	99.611
22.7320	97.781	96.485	91.440	100.000	99.685
24.9540	97.806	96.491	92.016	100.000	99.703
27.3930	97.822	96.533	92.552	100.000	99.709
30.0710	97.882	96.706	93.103	100.000	99.720
33.0110	98.091	97.128	93.738	100.000	99.751

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

	SLC-N2-01	SLC-N2-024	SLC-N2-048	SLC-N2-096	SLC-N2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
36.2390	98.526	97.855	94.526	100.000	99.810
39.7810	99.121	98.750	95.514	100.000	99.886
43.6700	99.637	99.494	96.697	100.000	99.952
47.9400	99.922	99.894	98.001	100.000	99.990
52.6260	99.993	99.990	99.106	100.000	99.999
57.7710	100.000	100.000	99.760	100.000	100.000
63.4190	100.000	100.000	99.965	100.000	100.000
69.6190	100.000	100.000	99.998	100.000	100.000
76.4250	100.000	100.000	100.000	100.000	100.000
83.8970	100.000	100.000	100.000	100.000	100.000
92.0990	100.000	100.000	100.000	100.000	100.000
101.1000	100.000	100.000	100.000	100.000	100.000
110.9900	100.000	100.000	100.000	100.000	100.000
121.8400	100.000	100.000	100.000	100.000	100.000
133.7500	100.000	100.000	100.000	100.000	100.000
146.8200	100.000	100.000	100.000	100.000	100.000
161.1800	100.000	100.000	100.000	100.000	100.000
176.9300	100.000	100.000	100.000	100.000	100.000
194.2300	100.000	100.000	100.000	100.000	100.000
213.2200	100.000	100.000	100.000	100.000	100.000
234.0700	100.000	100.000	100.000	100.000	100.000
256.9500	100.000	100.000	100.000	100.000	100.000
282.0700	100.000	100.000	100.000	100.000	100.000
309.6400	100.000	100.000	100.000	100.000	100.000
339.9200	100.000	100.000	100.000	100.000	100.000
373.1500	100.000	100.000	100.000	100.000	100.000
409.6300	100.000	100.000	100.000	100.000	100.000
449.6700	100.000	100.000	100.000	100.000	100.000
493.6300	100.000	100.000	100.000	100.000	100.000
541.8900	100.000	100.000	100.000	100.000	100.000
594.8700	100.000	100.000	100.000	100.000	100.000
653.0200	100.000	100.000	100.000	100.000	100.000

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

	SLC-N2-01	SLC-N2-024	SLC-N2-048	SLC-N2-096	SLC-N2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
716.8700	100.000	100.000	100.000	100.000	100.000
786.9500	100.000	100.000	100.000	100.000	100.000
863.8800	100.000	100.000	100.000	100.000	100.000
948.3400	100.000	100.000	100.000	100.000	100.000

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

File name:	EMR-O2				
File ID:	TVA KINGSTON				
Volume	EMR-O2-001	EMR-O2-024	EMR-O2-048	EMR-O2-096	EMR-O2-240
%					
	Particle	Particle	Particle	Particle	Particle
	Diameter	Diameter	Diameter	Diameter	Diameter
	um <	um <	um <	um <	um <
10	0.926	0.925	0.925	0.893	0.904
25	1.666	1.575	1.600	1.648	1.699
50	2.942	2.757	2.926	2.949	3.155
75	4.663	4.546	5.057	4.613	5.074
90	6.698	6.919	8.115	6.453	7.313
	EMR-O2-001	EMR-O2-024	EMR-O2-048	EMR-O2-096	EMR-O2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
0.3752	-	-	-	-	-
0.4119	0.225	0.209	0.208	0.251	0.243
0.4521	0.624	0.578	0.576	0.695	0.673
0.4964	1.206	1.121	1.118	1.341	1.299
0.5449	2.030	1.897	1.895	2.251	2.184
0.5981	3.053	2.879	2.878	3.374	3.277
0.6566	4.251	4.050	4.052	4.675	4.547
0.7208	5.607	5.407	5.412	6.130	5.972
0.7913	7.121	6.958	6.966	7.733	7.545
0.8686	8.782	8.705	8.711	9.466	9.245
0.9536	10.581	10.647	10.642	11.312	11.053
1.0468	12.517	12.790	12.759	13.264	12.960
1.1491	14.607	15.151	15.070	15.334	14.969
1.2614	16.876	17.752	17.589	17.550	17.102
1.3848	19.352	20.610	20.324	19.943	19.378
1.5201	22.067	23.741	23.281	22.550	21.825
1.6688	25.052	27.152	26.463	25.409	24.474

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

	EMR-O2-001	EMR-O2-024	EMR-O2-048	EMR-O2-096	EMR-O2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
1.8319	28.339	30.852	29.875	28.561	27.362
2.0110	31.951	34.835	33.512	32.044	30.521
2.2076	35.899	39.083	37.361	35.883	33.978
2.4234	40.180	43.560	41.400	40.086	37.745
2.6603	44.766	48.217	45.595	44.633	41.824
2.9204	49.611	52.994	49.908	49.484	46.195
3.2059	54.647	57.820	54.293	54.577	50.821
3.5193	59.794	62.622	58.702	59.835	55.650
3.8634	64.961	67.325	63.081	65.162	60.615
4.2411	70.043	71.854	67.374	70.438	65.631
4.6557	74.925	76.137	71.524	75.531	70.595
5.1109	79.489	80.101	75.471	80.306	75.384
5.6105	83.630	83.683	79.152	84.646	79.874
6.1590	87.264	86.826	82.505	88.450	83.953
6.7611	90.322	89.488	85.473	91.628	87.521
7.4221	92.750	91.634	88.011	94.102	90.490
8.1477	94.521	93.259	90.094	95.842	92.793
8.9443	95.688	94.405	91.727	96.929	94.421
9.8187	96.412	95.182	92.960	97.562	95.486
10.7790	96.905	95.746	93.894	97.975	96.190
11.8320	97.352	96.248	94.656	98.339	96.752
12.9890	97.871	96.806	95.369	98.744	97.334
14.2590	98.485	97.471	96.122	99.190	98.004
15.6530	99.104	98.205	96.947	99.592	98.715
17.1830	99.596	98.902	97.797	99.854	99.335
18.8630	99.876	99.452	98.574	99.969	99.746
20.7070	99.980	99.793	99.176	99.997	99.937
22.7320	99.999	99.948	99.551	100.000	99.992
24.9540	100.000	99.993	99.731	100.000	100.000
27.3930	100.000	100.000	99.805	100.000	100.000
30.0710	100.000	100.000	99.842	100.000	100.000
33.0110	100.000	100.000	99.876	100.000	100.000

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

	EMR-O2-001	EMR-O2-024	EMR-O2-048	EMR-O2-096	EMR-O2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
36.2390	100.000	100.000	99.913	100.000	100.000
39.7810	100.000	100.000	99.952	100.000	100.000
43.6700	100.000	100.000	99.982	100.000	100.000
47.9400	100.000	100.000	99.996	100.000	100.000
52.6260	100.000	100.000	100.000	100.000	100.000
57.7710	100.000	100.000	100.000	100.000	100.000
63.4190	100.000	100.000	100.000	100.000	100.000
69.6190	100.000	100.000	100.000	100.000	100.000
76.4250	100.000	100.000	100.000	100.000	100.000
83.8970	100.000	100.000	100.000	100.000	100.000
92.0990	100.000	100.000	100.000	100.000	100.000
101.1000	100.000	100.000	100.000	100.000	100.000
110.9900	100.000	100.000	100.000	100.000	100.000
121.8400	100.000	100.000	100.000	100.000	100.000
133.7500	100.000	100.000	100.000	100.000	100.000
146.8200	100.000	100.000	100.000	100.000	100.000
161.1800	100.000	100.000	100.000	100.000	100.000
176.9300	100.000	100.000	100.000	100.000	100.000
194.2300	100.000	100.000	100.000	100.000	100.000
213.2200	100.000	100.000	100.000	100.000	100.000
234.0700	100.000	100.000	100.000	100.000	100.000
256.9500	100.000	100.000	100.000	100.000	100.000
282.0700	100.000	100.000	100.000	100.000	100.000
309.6400	100.000	100.000	100.000	100.000	100.000
339.9200	100.000	100.000	100.000	100.000	100.000
373.1500	100.000	100.000	100.000	100.000	100.000
409.6300	100.000	100.000	100.000	100.000	100.000
449.6700	100.000	100.000	100.000	100.000	100.000
493.6300	100.000	100.000	100.000	100.000	100.000
541.8900	100.000	100.000	100.000	100.000	100.000
594.8700	100.000	100.000	100.000	100.000	100.000
653.0200	100.000	100.000	100.000	100.000	100.000

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

	EMR-O2-001	EMR-O2-024	EMR-O2-048	EMR-O2-096	EMR-O2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
716.8700	100.000	100.000	100.000	100.000	100.000
786.9500	100.000	100.000	100.000	100.000	100.000
863.8800	100.000	100.000	100.000	100.000	100.000
948.3400	100.000	100.000	100.000	100.000	100.000

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

File name:	EMR-N2				
File ID:	TVA KINGSTON				
Volume	EMR-N2-001	EMR-N2-024	EMR-N2-048	EMR-N2-096	EMR-N2-240
%					
	Particle	Particle	Particle	Particle	Particle
	Diameter	Diameter	Diameter	Diameter	Diameter
	um <	um <	um <	um <	um <
10	0.919	0.903	0.902	0.880	0.920
25	1.676	1.572	1.545	1.650	1.716
50	3.032	2.774	2.734	3.034	3.233
75	4.938	4.462	4.495	4.776	5.395
90	7.364	6.509	6.739	6.657	8.221
	EMR-N2-001	EMR-N2-024	EMR-N2-048	EMR-N2-096	EMR-N2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
0.3752	-	-	-	-	-
0.4119	0.231	0.231	0.224	0.260	0.230
0.4521	0.640	0.638	0.620	0.720	0.637
0.4964	1.236	1.234	1.201	1.388	1.231
0.5449	2.079	2.082	2.030	2.330	2.073
0.5981	3.125	3.143	3.076	3.491	3.119
0.6566	4.346	4.394	4.319	4.833	4.341
0.7208	5.724	5.823	5.751	6.332	5.720
0.7913	7.257	7.431	7.378	7.976	7.252
0.8686	8.931	9.216	9.199	9.745	8.922
0.9536	10.734	11.168	11.209	11.615	10.711
1.0468	12.662	13.290	13.410	13.576	12.611
1.1491	14.726	15.594	15.814	15.632	14.626
1.2614	16.952	18.105	18.441	17.807	16.772
1.3848	19.364	20.849	21.309	20.128	19.066
1.5201	21.991	23.848	24.431	22.627	21.526
1.6688	24.859	27.121	27.819	25.341	24.177

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

	EMR-N2-001	EMR-N2-024	EMR-N2-048	EMR-N2-096	EMR-N2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
1.8319	27.999	30.687	31.482	28.313	27.048
2.0110	31.436	34.555	35.417	31.582	30.163
2.2076	35.183	38.727	39.612	35.183	33.538
2.4234	39.234	43.182	44.041	39.134	37.182
2.6603	43.566	47.878	48.660	43.429	41.089
2.9204	48.137	52.753	53.412	48.045	45.241
3.2059	52.894	57.740	58.228	52.937	49.605
3.5193	57.768	62.763	63.038	58.043	54.136
3.8634	62.680	67.737	67.771	63.282	58.775
4.2411	67.538	72.562	72.346	68.545	63.453
4.6557	72.239	77.130	76.680	73.700	68.086
5.1109	76.686	81.343	80.687	78.608	72.580
5.6105	80.786	85.126	84.296	83.136	76.836
6.1590	84.457	88.413	87.449	87.166	80.764
6.7611	87.626	91.143	90.099	90.590	84.282
7.4221	90.228	93.259	92.204	93.308	87.317
8.1477	92.237	94.763	93.747	95.261	89.819
8.9443	93.704	95.768	94.791	96.508	91.778
9.8187	94.759	96.471	95.487	97.240	93.254
10.7790	95.561	97.068	96.033	97.706	94.368
11.8320	96.243	97.691	96.602	98.103	95.261
12.9890	96.905	98.378	97.297	98.540	96.056
14.2590	97.581	99.052	98.104	99.031	96.826
15.6530	98.240	99.576	98.892	99.489	97.578
17.1830	98.818	99.871	99.499	99.804	98.259
18.8630	99.277	99.979	99.841	99.953	98.811
20.7070	99.609	99.999	99.969	99.994	99.211
22.7320	99.829	100.000	99.997	100.000	99.489
24.9540	99.946	100.000	100.000	100.000	99.686
27.3930	99.991	100.000	100.000	100.000	99.821
30.0710	99.999	100.000	100.000	100.000	99.903
33.0110	100.000	100.000	100.000	100.000	99.948

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

	EMR-N2-001	EMR-N2-024	EMR-N2-048	EMR-N2-096	EMR-N2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
36.2390	100.000	100.000	100.000	100.000	99.975
39.7810	100.000	100.000	100.000	100.000	99.990
43.6700	100.000	100.000	100.000	100.000	99.997
47.9400	100.000	100.000	100.000	100.000	99.999
52.6260	100.000	100.000	100.000	100.000	100.000
57.7710	100.000	100.000	100.000	100.000	100.000
63.4190	100.000	100.000	100.000	100.000	100.000
69.6190	100.000	100.000	100.000	100.000	100.000
76.4250	100.000	100.000	100.000	100.000	100.000
83.8970	100.000	100.000	100.000	100.000	100.000
92.0990	100.000	100.000	100.000	100.000	100.000
101.1000	100.000	100.000	100.000	100.000	100.000
110.9900	100.000	100.000	100.000	100.000	100.000
121.8400	100.000	100.000	100.000	100.000	100.000
133.7500	100.000	100.000	100.000	100.000	100.000
146.8200	100.000	100.000	100.000	100.000	100.000
161.1800	100.000	100.000	100.000	100.000	100.000
176.9300	100.000	100.000	100.000	100.000	100.000
194.2300	100.000	100.000	100.000	100.000	100.000
213.2200	100.000	100.000	100.000	100.000	100.000
234.0700	100.000	100.000	100.000	100.000	100.000
256.9500	100.000	100.000	100.000	100.000	100.000
282.0700	100.000	100.000	100.000	100.000	100.000
309.6400	100.000	100.000	100.000	100.000	100.000
339.9200	100.000	100.000	100.000	100.000	100.000
373.1500	100.000	100.000	100.000	100.000	100.000
409.6300	100.000	100.000	100.000	100.000	100.000
449.6700	100.000	100.000	100.000	100.000	100.000
493.6300	100.000	100.000	100.000	100.000	100.000
541.8900	100.000	100.000	100.000	100.000	100.000
594.8700	100.000	100.000	100.000	100.000	100.000
653.0200	100.000	100.000	100.000	100.000	100.000

Appendix C
Elutriate Particle Size Analysis

TVA Kingston Elutriate Particle Size Distribution Averages
(Analysis by Coulter Counter)

	EMR-N2-001	EMR-N2-024	EMR-N2-048	EMR-N2-096	EMR-N2-240
Channel					
Diameter	Cum. <	Cum. <	Cum. <	Cum. <	Cum. <
(Lower)	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%
716.8700	100.000	100.000	100.000	100.000	100.000
786.9500	100.000	100.000	100.000	100.000	100.000
863.8800	100.000	100.000	100.000	100.000	100.000
948.3400	100.000	100.000	100.000	100.000	100.000

Appendix D: Chemistry Data Reports

Appendix D. Chemistry data reports



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

03 September 2009

Tony Bednar

ERDC - ECB

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RE: TVA Fly Ash Project

Enclosed are the results of analyses for samples received by the laboratory on 15-Jun-2009-27-Aug-2009. The samples associated with this report will be held for 90 days from the date of this report. The raw data associated with this report will be held for 5 years from the date of this report. If you need us to hold onto the samples or the data longer than these specified times, you will need to notify us in writing at least 30 days before the expiration dates. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

DRAFT REPORT

DATA SUBJECT TO CHANGE



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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- -, -

Project Manager: Tony Bednar

Reported:
03-Sep-2009

WORK ORDER SUMMARY

Sample ID	Laboratory ID	Matrix	Date Sampled	Date of Work Order
DRAFT: EMR Sediment	9061502-01	Soil/Sediment	12-Jun-2009	15-Jun-2009
DRAFT: SLC Sediment	9061502-02	Soil/Sediment	12-Jun-2009	15-Jun-2009
DRAFT: RF1-SD-MT-A Sediment	9061502-03	Soil/Sediment	12-Jun-2009	15-Jun-2009
DRAFT: RF2-SD-MT-A Sediment	9061502-04	Soil/Sediment	12-Jun-2009	15-Jun-2009
DRAFT: RF3-SD-MT-A Sediment	9061502-05	Soil/Sediment	12-Jun-2009	15-Jun-2009
DRAFT: RF4-SD-MT-A Sediment	9061502-06	Soil/Sediment	12-Jun-2009	15-Jun-2009
DRAFT: RF5-SD-MT-A Sediment	9061502-07	Soil/Sediment	12-Jun-2009	15-Jun-2009
DRAFT: RF6-SD-MT-A Sediment	9061502-08	Soil/Sediment	12-Jun-2009	15-Jun-2009
DRAFT: PIL-FA-MT-A	9061502-09	Soil/Sediment	12-Jun-2009	15-Jun-2009
DRAFT: EFL - WA - MT - A (Effluent from Settling	9061502-10	Water	12-Jun-2009	15-Jun-2009
DRAFT: Emory River Water	9061502-11	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC Water	9061502-12	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 1 Rep D	9061502-16	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 1 Rep E	9061502-17	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 1 Rep F	9061502-18	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 1 Rep D	9061502-22	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 1 Rep E	9061502-23	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 1 Rep F	9061502-24	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 1 Rep D	9061502-28	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 1 Rep E	9061502-29	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 1 Rep F	9061502-30	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 1 Rep D	9061502-34	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 1 Rep E	9061502-35	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 1 Rep F	9061502-36	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 24 Rep A	9061502-40	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 24 Rep B	9061502-41	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 24 Rep C	9061502-42	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 24 Rep A	9061502-46	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 24 Rep B	9061502-47	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 24 Rep C	9061502-48	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 24 Rep A	9061502-52	Water	12-Jun-2009	15-Jun-2009

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
 03-Sep-2009

WORK ORDER SUMMARY

Sample ID	Laboratory ID	Matrix	Date Sampled	Date of Work Order
DRAFT: SLC MT N2 Hour 24 Rep B	9061502-53	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 24 Rep C	9061502-54	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 24 Rep A	9061502-58	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 24 Rep B	9061502-59	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 24 Rep C	9061502-60	Water	12-Jun-2009	15-Jun-2009
DRAFT: EFL - WA - MT - A (Effluent from Settling	9061502-61	Water	12-Jun-2009	15-Jun-2009
DRAFT: Emory River Water - Total Metals	9061502-62	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC Water - Total Metals	9061502-63	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 1 Rep D - Total Metals	9061502-64	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 1 Rep E - Total Metals	9061502-65	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 1 Rep F - Total Metals	9061502-66	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 1 Rep D - Total Metals	9061502-67	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 1 Rep E - Total Metals	9061502-68	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 1 Rep F - Total Metals	9061502-69	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 1 Rep D - Total Metals	9061502-70	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 1 Rep E - Total Metals	9061502-71	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 1 Rep F - Total Metals	9061502-72	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 1 Rep D - Total Metals	9061502-73	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 1 Rep E - Total Metals	9061502-74	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 1 Rep F - Total Metals	9061502-75	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 24 Rep A - Total Metals	9061502-76	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 24 Rep B - Total Metals	9061502-77	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 24 Rep C - Total Metals	9061502-78	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 24 Rep A - Total Metals	9061502-79	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 24 Rep B - Total Metals	9061502-80	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 24 Rep C - Total Metals	9061502-81	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 24 Rep A - Total Metals	9061502-82	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 24 Rep B - Total Metals	9061502-83	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 24 Rep C - Total Metals	9061502-84	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 24 Rep A - Total Metals	9061502-85	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 24 Rep B - Total Metals	9061502-86	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 24 Rep C - Total Metals	9061502-87	Water	12-Jun-2009	15-Jun-2009

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

WORK ORDER SUMMARY

Sample ID	Laboratory ID	Matrix	Date Sampled	Date of Work Order
DRAFT: EMR MT N2 Hour 48 Rep A	9061503-04	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 48 Rep B	9061503-05	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 48 Rep C	9061503-06	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 48 Rep A	9061503-10	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 48 Rep B	9061503-11	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 48 Rep C	9061503-12	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 48 Rep A	9061503-16	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 48 Rep B	9061503-17	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 48 Rep C	9061503-18	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 48 Rep A	9061503-22	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 48 Rep B	9061503-23	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 48 Rep C	9061503-24	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 48 Rep A - Total Metals	9061503-25	Water	15-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 48 Rep B - Total Metals	9061503-26	Water	15-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 48 Rep C - Total Metals	9061503-27	Water	15-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 48 Rep A - Total Metals	9061503-28	Water	15-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 48 Rep B - Total Metals	9061503-29	Water	15-Jun-2009	15-Jun-2009
DRAFT: EMR MT O2 Hour 48 Rep C - Total Metals	9061503-30	Water	15-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 48 Rep A - Total Metals	9061503-31	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 48 Rep B - Total Metals	9061503-32	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT N2 Hour 48 Rep C - Total Metals	9061503-33	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 48 Rep A - Total Metals	9061503-34	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 48 Rep B - Total Metals	9061503-35	Water	12-Jun-2009	15-Jun-2009
DRAFT: SLC MT O2 Hour 48 Rep C - Total Metals	9061503-36	Water	12-Jun-2009	15-Jun-2009
DRAFT: EMR MT N2 Hour 96 Rep A	9061701-01	Water	17-Jun-2009	17-Jun-2009
DRAFT: EMR MT N2 Hour 96 Rep B	9061701-02	Water	17-Jun-2009	17-Jun-2009
DRAFT: EMR MT N2 Hour 96 Rep C	9061701-03	Water	17-Jun-2009	17-Jun-2009
DRAFT: EMR MT O2 Hour 96 Rep A	9061701-04	Water	17-Jun-2009	17-Jun-2009
DRAFT: EMR MT O2 Hour 96 Rep B	9061701-05	Water	17-Jun-2009	17-Jun-2009
DRAFT: EMR MT O2 Hour 96 Rep C	9061701-06	Water	17-Jun-2009	17-Jun-2009
DRAFT: SLC MT N2 Hour 96 Rep A	9061701-07	Water	17-Jun-2009	17-Jun-2009

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Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
 03-Sep-2009

WORK ORDER SUMMARY

Sample ID	Laboratory ID	Matrix	Date Sampled	Date of Work Order
DRAFT: SLC MT N2 Hour 96 Rep B	9061701-08	Water	17-Jun-2009	17-Jun-2009
DRAFT: SLC MT N2 Hour 96 Rep C	9061701-09	Water	17-Jun-2009	17-Jun-2009
DRAFT: SLC MT O2 Hour 96 Rep A	9061701-10	Water	17-Jun-2009	17-Jun-2009
DRAFT: SLC MT O2 Hour 96 Rep B	9061701-11	Water	17-Jun-2009	17-Jun-2009
DRAFT: SLC MT O2 Hour 96 Rep C	9061701-12	Water	17-Jun-2009	17-Jun-2009
DRAFT: EMR MT N2 Hour 96 Rep A - Total Metals	9061701-13	Water	17-Jun-2009	17-Jun-2009
DRAFT: EMR MT N2 Hour 96 Rep B - Total Metals	9061701-14	Water	17-Jun-2009	17-Jun-2009
DRAFT: EMR MT N2 Hour 96 Rep C - Total Metals	9061701-15	Water	17-Jun-2009	17-Jun-2009
DRAFT: EMR MT O2 Hour 96 Rep A - Total Metals	9061701-16	Water	17-Jun-2009	17-Jun-2009
DRAFT: EMR MT O2 Hour 96 Rep B - Total Metals	9061701-17	Water	17-Jun-2009	17-Jun-2009
DRAFT: EMR MT O2 Hour 96 Rep C - Total Metals	9061701-18	Water	17-Jun-2009	17-Jun-2009
DRAFT: SLC MT N2 Hour 96 Rep A - Total Metals	9061701-19	Water	17-Jun-2009	17-Jun-2009
DRAFT: SLC MT N2 Hour 96 Rep B - Total Metals	9061701-20	Water	17-Jun-2009	17-Jun-2009
DRAFT: SLC MT N2 Hour 96 Rep C - Total Metals	9061701-21	Water	17-Jun-2009	17-Jun-2009
DRAFT: SLC MT O2 Hour 96 Rep A - Total Metals	9061701-22	Water	17-Jun-2009	17-Jun-2009
DRAFT: SLC MT O2 Hour 96 Rep B - Total Metals	9061701-23	Water	17-Jun-2009	17-Jun-2009
DRAFT: SLC MT O2 Hour 96 Rep C - Total Metals	9061701-24	Water	17-Jun-2009	17-Jun-2009
DRAFT: EMR MT N2 Hour 240 Rep A	9062302-01	Water	23-Jun-2009	23-Jun-2009
DRAFT: EMR MT N2 Hour 240 Rep B	9062302-02	Water	23-Jun-2009	23-Jun-2009
DRAFT: EMR MT N2 Hour 240 Rep C	9062302-03	Water	23-Jun-2009	23-Jun-2009
DRAFT: EMR MT O2 Hour 240 Rep A	9062302-04	Water	23-Jun-2009	23-Jun-2009
DRAFT: EMR MT O2 Hour 240 Rep B	9062302-05	Water	23-Jun-2009	23-Jun-2009
DRAFT: EMR MT O2 Hour 240 Rep C	9062302-06	Water	23-Jun-2009	23-Jun-2009
DRAFT: SLC MT N2 Hour 240 Rep A	9062302-07	Water	23-Jun-2009	23-Jun-2009
DRAFT: SLC MT N2 Hour 240 Rep B	9062302-08	Water	23-Jun-2009	23-Jun-2009
DRAFT: SLC MT N2 Hour 240 Rep C	9062302-09	Water	23-Jun-2009	23-Jun-2009
DRAFT: SLC MT O2 Hour 240 Rep A	9062302-10	Water	23-Jun-2009	23-Jun-2009
DRAFT: SLC MT O2 Hour 240 Rep B	9062302-11	Water	23-Jun-2009	23-Jun-2009
DRAFT: SLC MT O2 Hour 240 Rep C	9062302-12	Water	23-Jun-2009	23-Jun-2009
DRAFT: EMR MT N2 Hour 240 Rep A - Total Metal	9062302-13	Water	23-Jun-2009	23-Jun-2009
DRAFT: EMR MT N2 Hour 240 Rep B - Total Metal	9062302-14	Water	23-Jun-2009	23-Jun-2009
DRAFT: EMR MT N2 Hour 240 Rep C - Total Metal	9062302-15	Water	23-Jun-2009	23-Jun-2009

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
 03-Sep-2009

WORK ORDER SUMMARY

Sample ID	Laboratory ID	Matrix	Date Sampled	Date of Work Order
DRAFT: EMR MT O2 Hour 240 Rep A - Total Metal	9062302-16	Water	23-Jun-2009	23-Jun-2009
DRAFT: EMR MT O2 Hour 240 Rep B - Total Metal	9062302-17	Water	23-Jun-2009	23-Jun-2009
DRAFT: EMR MT O2 Hour 240 Rep C - Total Metal	9062302-18	Water	23-Jun-2009	23-Jun-2009
DRAFT: SLC MT N2 Hour 240 Rep A - Total Metals	9062302-19	Water	23-Jun-2009	23-Jun-2009
DRAFT: SLC MT N2 Hour 240 Rep B - Total Metals	9062302-20	Water	23-Jun-2009	23-Jun-2009
DRAFT: SLC MT N2 Hour 240 Rep C - Total Metals	9062302-21	Water	23-Jun-2009	23-Jun-2009
DRAFT: SLC MT O2 Hour 240 Rep A - Total Metals	9062302-22	Water	23-Jun-2009	23-Jun-2009
DRAFT: SLC MT O2 Hour 240 Rep B - Total Metals	9062302-23	Water	23-Jun-2009	23-Jun-2009
DRAFT: SLC MT O2 Hour 240 Rep C - Total Metals	9062302-24	Water	23-Jun-2009	23-Jun-2009
DRAFT: EMR - EL - AF - 100 - A	9071602-01	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 100 - B	9071602-02	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 100 - C	9071602-03	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 100 - D	9071602-04	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 100 - E	9071602-05	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 50 - A	9071602-06	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 50 - B	9071602-07	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 50 - C	9071602-08	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 50 - D	9071602-09	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 50 - E	9071602-10	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 10 - A	9071602-11	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 10 - B	9071602-12	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 10 - C	9071602-13	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 10 - D	9071602-14	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 10 - E	9071602-15	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 0 - A	9071602-16	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 0 - B	9071602-17	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 0 - C	9071602-18	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 0 - D	9071602-19	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: EMR - EL - AF - 0 - E	9071602-20	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: Control - A	9071602-21	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: Control - B	9071602-22	Tissue	15-Jul-2009	16-Jul-2009

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
 03-Sep-2009

WORK ORDER SUMMARY

Sample ID	Laboratory ID	Matrix	Date Sampled	Date of Work Order
DRAFT: Control - C	9071602-23	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: Control - D	9071602-24	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: Control - E	9071602-25	Tissue	15-Jul-2009	16-Jul-2009
DRAFT: Larvae Food	9071602-26	Solid	15-Jul-2009	16-Jul-2009
DRAFT: Adult Food	9071602-27	Solid	15-Jul-2009	16-Jul-2009
DRAFT: Fish Tissue Dechlor 1	9082706-01	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue Dechlor 2	9082706-02	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue Dechlor 3	9082706-03	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue Dechlor 4	9082706-04	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue Dechlor 5	9082706-05	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue EMR - WA 1	9082706-06	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue EMR - WA 2	9082706-07	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue EMR - WA 3	9082706-08	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue EMR - WA 4	9082706-09	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue EMR - WA 5	9082706-10	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue EMR - EL 1	9082706-11	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue EMR - EL 2	9082706-12	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue EMR - EL 3	9082706-13	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue EMR - EL 4	9082706-14	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Tissue EMR - EL 5	9082706-15	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut Dechlor 1	9082706-16	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut Dechlor 2	9082706-17	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut Dechlor 3	9082706-18	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut Dechlor 4	9082706-19	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut Dechlor 5	9082706-20	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut EMR - WA 1	9082706-21	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut EMR - WA 2	9082706-22	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut EMR - WA 3	9082706-23	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut EMR - WA 4	9082706-24	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut EMR - WA 5	9082706-25	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut EMR - EL 1	9082706-26	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut EMR - EL 2	9082706-27	Tissue	26-Aug-2009	27-Aug-2009

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:
03-Sep-2009

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Project Manager: Tony Bednar

WORK ORDER SUMMARY

Sample ID	Laboratory ID	Matrix	Date Sampled	Date of Work Order
DRAFT: Fish Gut EMR - EL 3	9082706-28	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut EMR - EL 4	9082706-29	Tissue	26-Aug-2009	27-Aug-2009
DRAFT: Fish Gut EMR - EL 5	9082706-30	Tissue	26-Aug-2009	27-Aug-2009



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR Sediment
9061502-01 (Soil/Sediment)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.0732	0.00396	mg/kg	1	06-Jul-2009	22-Jul-2009	EPA 7471A	
Strontium	87.4	4.00	mg/kg	2	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	4890	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Calcium	2410	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	10400	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	559	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Potassium	625	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	65.2	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.233	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	65.8	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	655	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Beryllium	7.15	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.576	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Chromium	48.7	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Cobalt	25.6	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	84.1	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	36.4	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	153	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Molybdenum	4.04	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	52.6	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	6.97	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	0.426	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Thallium	2.19	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	133	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	77.4	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC Sediment
9061502-02 (Soil/Sediment)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.0294	0.00399	mg/kg	1	06-Jul-2009	22-Jul-2009	EPA 7471A	
Strontium	69.9	4.00	mg/kg	2	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	29900	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Calcium	6510	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	22200	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	2380	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Potassium	4890	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	608	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.212	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	76.2	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	515	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Beryllium	6.03	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.631	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Chromium	49.2	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Cobalt	23.1	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	76.4	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	33.1	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	187	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Molybdenum	4.23	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	49.9	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	6.08	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	0.335	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Thallium	2.04	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	124	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	72.1	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: RF1-SD-MT-A Sediment
9061502-03 (Soil/Sediment)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.0211	0.00397	mg/kg	1	06-Jul-2009	22-Jul-2009	EPA 7471A	
Strontium	1.82	4.00	mg/kg	2	25-Jun-2009	25-Jun-2009	EPA 6010B	J
Aluminum	4650	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Calcium	1800	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	7990	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	674	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Potassium	760	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	52.0	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0262	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	J, B
Arsenic	1.71	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	48.0	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Beryllium	0.584	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.0991	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Chromium	8.25	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Cobalt	7.01	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	5.58	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	6.68	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	313	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Molybdenum	0.255	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	11.5	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.247	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	0.0593	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Thallium	0.0776	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	9.16	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	35.0	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: RF2-SD-MT-A Sediment
9061502-04 (Soil/Sediment)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.0239	0.00399	mg/kg	1	06-Jul-2009	22-Jul-2009	EPA 7471A	
Strontium	87.9	4.00	mg/kg	2	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	4950	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Calcium	2440	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	10600	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	566	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Potassium	633	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	66.1	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.292	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	2.69	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	73.5	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Beryllium	0.528	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.111	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Chromium	8.33	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Cobalt	6.16	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	5.33	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	9.06	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	233	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Molybdenum	0.273	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	9.96	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.271	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	0.0779	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Thallium	0.103	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	9.95	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	31.9	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: RF3-SD-MT-A Sediment
9061502-05 (Soil/Sediment)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.0110	0.00395	mg/kg	1	06-Jul-2009	22-Jul-2009	EPA 7471A	
Strontium	2.43	4.00	mg/kg	2	25-Jun-2009	25-Jun-2009	EPA 6010B	J
Aluminum	4040	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Calcium	6150	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	8670	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	1130	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Potassium	782	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	48.3	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0162	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	J, B
Arsenic	1.91	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	33.6	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Beryllium	0.496	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.0971	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Chromium	9.11	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Cobalt	6.27	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	5.49	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	9.33	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	209	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Molybdenum	0.224	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	12.4	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.114	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	0.0805	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Thallium	0.0595	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	8.33	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	61.2	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: RF4-SD-MT-A Sediment
9061502-06 (Soil/Sediment)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.0395	0.00399	mg/kg	1	06-Jul-2009	22-Jul-2009	EPA 7471A	
Strontium	3.25	4.00	mg/kg	2	25-Jun-2009	25-Jun-2009	EPA 6010B	J
Aluminum	8560	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Calcium	6860	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	10900	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	1700	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Potassium	1080	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	49.9	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0201	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	J, B
Arsenic	2.42	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	100	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Beryllium	0.870	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.248	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Chromium	13.0	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Cobalt	8.76	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	10.0	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	16.8	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	724	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Molybdenum	0.280	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	15.0	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.757	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	0.104	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Thallium	0.131	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	15.6	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	63.1	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: RF5-SD-MT-A Sediment
9061502-07 (Soil/Sediment)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.0875	0.00399	mg/kg	1	06-Jul-2009	22-Jul-2009	EPA 7471A	
Strontium	27.0	4.00	mg/kg	2	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	15100	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Calcium	14200	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	39600	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	2070	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Potassium	1910	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	182	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0500	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	10.9	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	118	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Beryllium	1.51	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.208	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Chromium	27.9	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Cobalt	9.92	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	24.0	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	45.3	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	518	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Molybdenum	1.03	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	16.9	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	1.48	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	0.172	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Thallium	0.297	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	33.8	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	64.8	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: RF6-SD-MT-A Sediment
9061502-08 (Soil/Sediment)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.0221	0.00397	mg/kg	1	06-Jul-2009	22-Jul-2009	EPA 7471A	
Strontium	3.08	4.00	mg/kg	2	25-Jun-2009	25-Jun-2009	EPA 6010B	J
Aluminum	6070	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Calcium	7320	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	10900	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	1610	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Potassium	1060	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	54.1	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0236	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	J, B
Arsenic	3.15	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	56.0	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Beryllium	0.707	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.117	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Chromium	11.1	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Cobalt	8.41	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	7.59	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	12.9	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	453	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Molybdenum	0.284	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	14.8	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.473	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	0.0667	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Thallium	0.0947	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	12.8	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	50.5	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: PIL-FA-MT-A
9061502-09 (Soil/Sediment)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.0279	0.00396	mg/kg	1	06-Jul-2009	22-Jul-2009	EPA 7471A	
Strontium	64.3	4.00	mg/kg	2	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	18600	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Calcium	6780	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	17500	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	1940	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Potassium	2760	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	482	2.00	mg/kg	2	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.145	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	46.9	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	510	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Beryllium	4.88	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.272	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Chromium	33.5	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Cobalt	16.9	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	50.0	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	20.2	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	88.7	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B
Molybdenum	3.20	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	34.0	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	5.44	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	0.220	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Thallium	1.35	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	86.2	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	41.5	0.0500	mg/kg	10	25-Jun-2009	26-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EFL - WA - MT - A (Effluent from Settling Pond)
9061502-10 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	117	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000014	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.353	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.281	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	34.7	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	7.34	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	2.30	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	7.79	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0023	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0208	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.175	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	0.0041	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0012	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Molybdenum	0.0236	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0013	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Selenium	0.0054	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	0.0010	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B
Thallium	0.00029	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0317	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0064	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EFL - WA - MT - A (Effluent from Settling Pond)
9061502-10 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	7.63	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	U
Sulfate	47.9	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
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Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Emory River Water
9061502-11 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	30.0	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.0424	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Calcium	8.55	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	0.0525	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Magnesium	2.10	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.29	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.44	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Arsenic	0.0008	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Barium	0.0307	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Molybdenum	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Nickel	0.0009	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Silver	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J, B
Thallium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Vanadium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Zinc	0.0057	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: Emory River Water

9061502-11 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	2.26	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.365	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	11.5	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC Water
9061502-12 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	97.9	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.544	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.252	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	30.7	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.15	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.88	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.05	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0081	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0779	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.107	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0296	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0733	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0059	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J, B
Thallium	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0509	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0058	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC Water
9061502-12 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0
Chloride	3.71	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0
Nitrate as N	0.360	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0
Sulfate	38.1	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0



USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 1 Rep D
9061502-16 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	36.1	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.121	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0604	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	10.8	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.24	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.33	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.47	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0278	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0823	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0012	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0057	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0015	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0010	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0173	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0057	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT N2 Hour 1 Rep D

9061502-16 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	2.32	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.150	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	13.6	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 1 Rep E
9061502-17 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	34.9	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000012	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.111	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0515	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	10.4	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.18	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.33	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.49	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0239	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0791	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0013	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0054	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0013	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0009	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0152	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0062	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT N2 Hour 1 Rep E

9061502-17 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	2.40	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.360	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	14.0	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 1 Rep F
9061502-18 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	35.1	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.110	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Calcium	10.4	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.20	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.35	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.51	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0232	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0790	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0013	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0045	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0014	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.00067	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0008	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0147	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0064	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT N2 Hour 1 Rep F
9061502-18 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	2.38	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.104	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	12.5	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 1 Rep D
9061502-22 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	34.8	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000014	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.0998	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Calcium	10.2	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.23	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.34	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.48	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0198	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0768	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0016	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0048	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0011	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0008	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0128	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0062	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT O2 Hour 1 Rep D

9061502-22 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	2.36	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.413	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	12.3	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 1 Rep E
9061502-23 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	33.8	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000014	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.0915	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Calcium	9.95	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.19	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.31	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.44	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0002	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0177	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0731	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0013	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0032	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0010	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0109	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0055	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT O2 Hour 1 Rep E

9061502-23 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	2.32	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.410	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	12.2	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 1 Rep F
9061502-24 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	35.5	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000013	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.116	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0516	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	10.6	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.20	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.34	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.44	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0252	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0832	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0013	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0063	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0013	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.00054	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0008	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0163	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0056	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT O2 Hour 1 Rep F
9061502-24 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	2.36	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.400	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	12.5	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 1 Rep D
9061502-28 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	96.8	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000012	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.538	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.118	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	30.4	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.04	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.85	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.06	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0077	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0771	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0992	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0345	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0720	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0055	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0540	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0054	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT N2 Hour 1 Rep D

9061502-28 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	3.78	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.370	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	36.6	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 1 Rep E
9061502-29 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	97.7	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.00001	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.535	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.122	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	30.6	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.19	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.90	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.02	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0080	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0776	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.103	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	1.81	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	0.0366	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Manganese	0.0353	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0738	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0029	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Selenium	0.0058	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0536	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	1.01	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT N2 Hour 1 Rep E

9061502-29 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	3.79	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.390	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	36.6	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 1 Rep F
9061502-30 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	97.5	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.536	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.124	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	30.6	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.10	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.90	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.04	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0078	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0763	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.103	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0351	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0732	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0057	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0542	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0052	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT N2 Hour 1 Rep F
9061502-30 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	3.76	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.370	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	35.9	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 1 Rep D
9061502-34 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	97.1	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000013	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.533	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.105	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	30.5	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.10	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.92	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.09	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0075	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0723	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0994	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0008	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0358	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0692	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.00067	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0058	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0537	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0059	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT O2 Hour 1 Rep D

9061502-34 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	3.87	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.380	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	36.2	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 1 Rep E
9061502-35 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	97.8	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.534	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0883	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	30.7	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.16	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.94	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.07	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0075	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0746	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0998	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0355	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0686	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0058	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0537	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0085	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT O2 Hour 1 Rep E

9061502-35 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	3.77	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.390	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	36.0	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 1 Rep F
9061502-36 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	97.6	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	8.30E-6	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.536	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0901	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	30.6	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.12	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.89	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.04	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0078	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0782	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0989	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0022	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0369	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0729	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0008	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0053	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.00058	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0531	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0080	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT O2 Hour 1 Rep F

9061502-36 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	3.74	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.380	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	35.7	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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ERDC - ECB

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 24 Rep A
9061502-40 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	37.7	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000011	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.135	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0583	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	11.3	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.28	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.36	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.51	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0359	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0879	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0014	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0033	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0018	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0013	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0235	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0060	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT N2 Hour 24 Rep A

9061502-40 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	2.61	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.380	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	14.6	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 24 Rep B
9061502-41 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	37.1	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000006	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.127	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0591	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	11.1	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.29	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.36	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.56	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0009	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0330	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0839	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0016	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0017	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0017	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0012	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0217	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0104	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT N2 Hour 24 Rep B

9061502-41 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	2.60	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.396	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	13.2	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 24 Rep C

9061502-42 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	37.5	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.134	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0637	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	11.3	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.29	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.37	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.66	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0008	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0355	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0838	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0014	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0026	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0017	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0014	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0233	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0053	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT N2 Hour 24 Rep C

9061502-42 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	2.80	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.390	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	13.4	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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Project Manager: Tony Bednar

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03-Sep-2009

DRAFT: EMR MT O2 Hour 24 Rep A

9061502-46 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	36.3	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.116	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Calcium	10.8	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.26	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.47	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.63	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0270	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0853	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0017	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0026	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0015	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0008	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0012	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0180	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0072	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT O2 Hour 24 Rep A

9061502-46 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	2.65	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.390	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	13.2	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 24 Rep B
9061502-47 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	35.1	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000016	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.104	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Calcium	10.4	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.21	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.36	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.47	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0224	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0784	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0014	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0020	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0015	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0010	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0167	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0062	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT O2 Hour 24 Rep B

9061502-47 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	2.49	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.380	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	13.1	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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ERDC - ECB

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 24 Rep C

9061502-48 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	37.2	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000014	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.129	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Calcium	11.2	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.27	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.35	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.48	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0308	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0928	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0014	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0043	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0016	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0011	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0213	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0060	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT O2 Hour 24 Rep C

9061502-48 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	2.51	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.280	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	13.2	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 24 Rep A
9061502-52 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	98.5	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.00003	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.539	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.192	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	30.8	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.27	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.94	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.13	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0080	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0808	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0970	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0012	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0284	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0733	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0064	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0558	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0066	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT N2 Hour 24 Rep A
9061502-52 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	4.05	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.380	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	43.5	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 24 Rep B
9061502-53 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	98.5	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.538	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.200	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	30.9	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.19	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.91	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.09	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0078	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0837	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0984	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0027	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0271	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0726	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0061	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0561	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0057	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT N2 Hour 24 Rep B
9061502-53 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0
Chloride	4.00	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0
Nitrate as N	0.370	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0
Sulfate	42.7	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0



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Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 24 Rep C
9061502-54 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	98.7	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.539	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.201	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	30.9	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.24	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.94	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.11	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0078	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0806	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0976	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0293	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0708	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.00057	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0065	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0569	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0066	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT N2 Hour 24 Rep C

9061502-54 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	4.03	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.370	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	43.6	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 24 Rep A
9061502-58 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	98.1	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000016	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.536	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.142	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	30.7	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.18	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.95	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.17	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0075	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0780	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0975	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0299	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0727	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0064	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0567	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0068	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT O2 Hour 24 Rep A
9061502-58 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	4.13	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.370	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	43.3	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 24 Rep B
9061502-59 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	98.2	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.536	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.126	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	30.8	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.19	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.95	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.13	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0079	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0772	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.101	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0009	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0303	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0703	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0065	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0570	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0055	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT O2 Hour 24 Rep B
9061502-59 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	3.86	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.360	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	38.1	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
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Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 24 Rep C
9061502-60 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	97.9	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000011	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.542	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.143	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	30.8	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.08	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.87	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.10	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0077	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0805	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0973	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0301	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0714	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0060	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0560	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0057	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT O2 Hour 24 Rep C
9061502-60 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Chloride	3.80	1.00	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Nitrate as N	0.400	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	
Sulfate	38.4	0.100	mg/L	1	14-Jul-2009	14-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EFL - WA - MT - A (Effluent from Settling Pond) - Total Metals
9061502-61 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	116	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000431	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.352	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	1.14	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	34.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	0.333	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	7.38	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	2.49	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	8.23	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0088	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.0192	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.182	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Chromium	0.0081	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0012	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Copper	0.0090	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0017	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Manganese	0.0235	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0236	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0055	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0043	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	0.0023	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Thallium	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Vanadium	0.0390	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0285	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Emory River Water - Total Metals
9061502-62 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	31.2	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000148	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.0429	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	J
Aluminum	0.228	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	8.93	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	0.253	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	2.17	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.71	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.01	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0088	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.0011	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Barium	0.0340	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Chromium	0.00095	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Cobalt	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Copper	0.0040	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Manganese	0.0351	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Nickel	0.0027	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Silver	0.0016	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J, B
Thallium	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Vanadium	0.0005	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Zinc	0.0210	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC Water - Total Metals
9061502-63 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	99.9	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000306	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.571	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	5.58	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	31.0	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	2.00	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.47	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.09	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.79	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0411	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.0767	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.167	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0009	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Cadmium	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Chromium	0.0063	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0034	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0190	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0065	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0482	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0738	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0115	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0046	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	0.0010	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J, B
Thallium	0.0008	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.0769	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0334	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 1 Rep D - Total Metals
9061502-64 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	68.5	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000553	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.490	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	38.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	18.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	15.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.44	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	8.73	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.82	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0066	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.139	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.765	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0062	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0013	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0462	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0284	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0949	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0661	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.132	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0076	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0570	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0061	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	0.0031	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Thallium	0.0039	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.142	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.103	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 1 Rep E - Total Metals
9061502-65 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	62.2	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000477	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.417	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	32.9	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	16.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	13.0	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.94	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	8.29	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.86	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0053	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.114	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.619	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0055	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0009	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0427	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0239	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0843	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0537	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.129	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0061	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0484	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0050	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	0.0025	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Thallium	0.0031	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.125	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0937	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 1 Rep F - Total Metals
9061502-66 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	63.8	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000388	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.437	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	34.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	17.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	13.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.09	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	7.68	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.88	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0054	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.118	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.686	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0055	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0010	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0413	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0256	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0881	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0575	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.125	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0065	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0498	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0063	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	0.0014	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J, B
Thallium	0.0034	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.142	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0933	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 1 Rep D - Total Metals
9061502-67 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	56.5	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000354	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.335	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	25.3	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	15.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	10.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.37	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	6.00	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.89	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0040	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.0899	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.503	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0042	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0008	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0369	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0191	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0708	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0413	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.102	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0049	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0407	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0037	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	0.0011	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J, B
Thallium	0.0024	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.109	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0941	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 1 Rep E - Total Metals
9061502-68 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	53.3	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000461	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.310	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	23.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	14.5	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	9.25	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.14	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	6.41	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.81	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0036	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.0767	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.449	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0041	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0006	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0313	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0178	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0617	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0361	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.104	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0043	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0364	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0027	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	0.0006	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J, B
Thallium	0.0021	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.0915	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0907	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 1 Rep F - Total Metals
9061502-69 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	67.9	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000359	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.475	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	37.0	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	18.3	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	14.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.40	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	8.12	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.25	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0055	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.129	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.709	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0060	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0012	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0469	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0279	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0954	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0602	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.139	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0069	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0544	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0067	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	0.0006	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J, B
Thallium	0.0033	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.139	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.164	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 1 Rep D - Total Metals
9061502-70 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	108	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000395	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.637	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	11.9	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	33.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	4.98	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.03	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.09	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.99	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0081	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.108	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.276	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0019	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Cadmium	0.00071	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0179	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0096	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0358	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0173	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0917	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0770	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0222	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0037	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0015	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.0999	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0648	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 1 Rep E - Total Metals
9061502-71 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	108	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000266	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.629	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	11.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	33.3	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	5.04	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.96	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.10	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.92	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0155	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.101	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.274	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0017	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0171	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0090	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0337	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0181	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0850	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0758	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0203	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0047	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0016	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.0950	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0725	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 1 Rep F - Total Metals
9061502-72 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	105	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000259	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.617	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	11.0	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	32.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	4.66	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.84	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	3.97	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.57	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0079	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.105	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.263	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0019	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Cadmium	0.0006	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0161	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0085	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0315	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0162	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0842	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0752	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0188	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0039	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0014	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.0982	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0461	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 1 Rep D - Total Metals
9061502-73 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	105	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.0001	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.616	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	10.5	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	32.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	4.32	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.85	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.00	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.86	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0084	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.0995	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.252	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0017	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0166	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0080	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0305	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0154	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0804	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0765	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0192	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0044	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0014	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.0937	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0487	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 1 Rep E - Total Metals
9061502-74 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	105	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000308	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.628	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	13.3	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	32.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	5.60	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.02	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.61	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.65	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0084	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.109	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.295	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0022	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0008	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0194	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0101	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0379	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0200	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0895	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0745	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0231	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0054	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0016	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.104	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0520	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 1 Rep F - Total Metals
9061502-75 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	108	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000218	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.651	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	13.9	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	33.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	5.92	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.16	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.87	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.85	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0090	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.112	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.309	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0022	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0009	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0198	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0107	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0382	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0211	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0978	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0749	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0235	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0055	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0017	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.107	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0533	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 24 Rep A - Total Metals
9061502-76 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	57.4	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000445	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.359	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	23.3	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	16.0	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	9.51	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.21	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.50	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.49	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0041	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.106	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.513	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0042	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0010	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0338	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0188	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0675	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0380	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.104	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0055	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0377	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0044	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0025	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.110	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0917	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 24 Rep B - Total Metals
9061502-77 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	55.6	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000412	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.337	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	22.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	15.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	9.20	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.16	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.69	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.56	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0076	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.0986	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.476	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0039	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0299	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0169	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0635	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0342	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0953	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0054	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0331	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0056	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0023	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.0989	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0701	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 24 Rep C - Total Metals
9061502-78 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	65.1	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000407	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.446	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	33.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	17.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	13.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.05	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	7.43	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.03	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0060	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.136	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.639	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0055	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0011	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0453	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0248	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0862	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0504	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.114	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0068	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0493	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0054	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0029	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.149	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0975	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 24 Rep A - Total Metals
9061502-79 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	52.3	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000181	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.294	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	18.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	14.7	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	7.62	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	3.81	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.05	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.64	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0083	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.0850	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.409	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0041	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0006	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0270	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0160	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0588	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0304	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0887	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0047	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0315	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0038	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0020	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.0918	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0752	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 24 Rep B - Total Metals
9061502-80 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	44.0	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000509	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.183	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	8.12	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	12.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	3.55	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	3.02	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	2.80	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.39	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0140	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.0515	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.230	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0019	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Cadmium	0.0005	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0167	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0078	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0314	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0162	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0569	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0031	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0183	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0014	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0012	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.0540	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0547	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 24 Rep C - Total Metals
9061502-81 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	51.4	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000358	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.293	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	17.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	14.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	7.30	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	3.72	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.70	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.46	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0039	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.0915	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.413	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0036	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0006	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0307	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0148	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0546	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0302	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0854	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0046	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0304	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0047	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0022	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.101	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0689	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 24 Rep A - Total Metals
9061502-82 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	104	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000508	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.615	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	13.0	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	31.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	5.49	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.97	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.36	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.82	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0087	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.113	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.281	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0022	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0188	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0098	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0347	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0188	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0824	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0761	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0214	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0060	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0016	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.102	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0503	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 24 Rep B - Total Metals
9061502-83 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	103	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000374	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.613	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	12.5	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	31.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	5.23	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.77	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.52	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.68	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0086	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.111	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.285	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0022	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0250	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0102	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0366	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0194	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0831	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0735	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0221	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0059	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0017	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.108	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0551	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 24 Rep C - Total Metals
9061502-84 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	105	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000358	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.618	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	13.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	32.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	5.48	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.02	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.43	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.95	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0092	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.110	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.284	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0022	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0008	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0177	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0094	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0360	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0188	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0873	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0762	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0210	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0063	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0016	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.0999	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0535	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 24 Rep A - Total Metals
9061502-85 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	106	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000409	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.626	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	11.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	32.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	4.66	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.94	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.35	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.72	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0087	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.109	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.275	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0019	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0168	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0087	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0325	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0168	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0858	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0780	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0197	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0063	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0016	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.103	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0442	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 24 Rep B - Total Metals
9061502-86 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	104	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000356	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.629	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	14.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	31.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	5.83	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.95	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.34	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	5.14	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0228	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.111	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.299	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0023	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0224	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0110	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0401	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0198	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0906	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0717	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0240	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0066	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0017	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.110	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0550	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 24 Rep C - Total Metals
9061502-87 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	109	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000292	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.656	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	15.5	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	33.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	6.44	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.24	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.84	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	5.02	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0085	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.117	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.324	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0024	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0012	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0209	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0110	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0413	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0210	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0928	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0759	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0256	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0086	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0018	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.113	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0564	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 48 Rep A
9061503-04 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	39.5	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.150	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0733	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	12.0	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.32	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.38	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.51	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0010	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0433	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0975	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0017	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0023	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0019	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0018	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0286	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0074	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT N2 Hour 48 Rep A

9061503-04 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Chloride	2.39	1.00	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Nitrate as N	0.424	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Sulfate	12.7	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 48 Rep B
9061503-05 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	38.8	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.145	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0601	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	11.7	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.32	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.38	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.67	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0009	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0400	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0952	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0014	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0019	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0019	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0017	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0274	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0049	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT N2 Hour 48 Rep B

9061503-05 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Chloride	2.71	1.00	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Nitrate as N	0.396	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Sulfate	12.7	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 48 Rep C
9061503-06 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	38.7	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000011	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.141	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0672	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	11.7	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.32	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.39	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.58	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0008	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0414	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0918	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0016	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0016	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0019	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0017	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.00044	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0287	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0054	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT N2 Hour 48 Rep C

9061503-06 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Chloride	2.49	1.00	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Nitrate as N	0.415	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Sulfate	12.6	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	



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ERDC - ECB

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 48 Rep A

9061503-10 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	37.1	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000016	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.124	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Calcium	11.2	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.25	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.43	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.57	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0310	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0920	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0016	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0020	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0017	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0013	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0217	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0055	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT O2 Hour 48 Rep A

9061503-10 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Chloride	2.49	1.00	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Nitrate as N	0.347	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Sulfate	12.4	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 48 Rep B
9061503-11 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	36.5	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.115	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Calcium	10.9	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.28	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.39	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.54	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0279	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0861	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0017	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0015	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0016	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0013	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0004	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0194	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0063	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT O2 Hour 48 Rep B

9061503-11 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Chloride	2.50	1.00	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Nitrate as N	0.376	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Sulfate	12.4	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 48 Rep C

9061503-12 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	38.4	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000008	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.141	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0507	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	11.6	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.30	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.42	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.58	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Arsenic	0.0358	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0973	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0024	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0028	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0018	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0008	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0017	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0269	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0061	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:
03-Sep-2009

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Project Manager: Tony Bednar

DRAFT: EMR MT O2 Hour 48 Rep C
9061503-12 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Chloride	2.51	1.00	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Nitrate as N	0.390	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Sulfate	12.5	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 48 Rep A
9061503-16 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	99.3	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.544	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.139	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	31.2	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.19	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.91	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.13	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0078	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0828	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0978	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0220	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0718	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0068	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0534	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0058	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT N2 Hour 48 Rep A

9061503-16 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Chloride	3.85	1.00	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Nitrate as N	0.359	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Sulfate	38.7	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 48 Rep B
9061503-17 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	98.6	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000028	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.537	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.148	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	30.9	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.22	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.91	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.05	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0081	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0855	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0991	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0228	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0741	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0005	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0071	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0578	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0055	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT N2 Hour 48 Rep B
9061503-17 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Chloride	3.74	1.00	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Nitrate as N	0.359	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Sulfate	38.2	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 48 Rep C
9061503-18 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	98.5	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.542	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.160	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	31.0	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.13	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.87	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.08	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0082	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0851	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.0981	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0236	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0730	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0068	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0596	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0083	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT N2 Hour 48 Rep C

9061503-18 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Chloride	3.77	1.00	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Nitrate as N	0.366	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Sulfate	38.4	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 48 Rep A
9061503-22 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	98.2	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000011	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.539	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0938	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	30.9	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.12	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	2.07	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.27	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0080	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0796	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.101	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0015	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0269	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0713	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0008	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0064	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0571	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0056	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT O2 Hour 48 Rep A

9061503-22 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Chloride	4.09	1.00	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Nitrate as N	0.392	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Sulfate	38.0	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 48 Rep B
9061503-23 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	99.3	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.541	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.117	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	31.2	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.22	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.92	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.10	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0079	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0820	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.101	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.00051	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0249	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0738	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.00067	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0073	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0570	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0060	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT O2 Hour 48 Rep B

9061503-23 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Chloride	3.76	1.00	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Nitrate as N	0.369	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Sulfate	37.8	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

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03-Sep-2009

DRAFT: SLC MT O2 Hour 48 Rep C
9061503-24 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	99.4	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.00001	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.544	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.116	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	31.2	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.20	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.95	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.13	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0080	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Arsenic	0.0794	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Barium	0.103	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Chromium	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Cobalt	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Copper	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Manganese	0.0248	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Molybdenum	0.0738	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Selenium	0.0074	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	U
Thallium	0.0007	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	J
Vanadium	0.0573	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	
Zinc	0.0060	0.0010	mg/L	2	16-Jun-2009	16-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT O2 Hour 48 Rep C
9061503-24 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Chloride	3.80	1.00	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Nitrate as N	0.384	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	
Sulfate	37.9	0.100	mg/L	1	15-Jul-2009	15-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 48 Rep A - Total Metals
9061503-25 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	67.6	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000435	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.450	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	31.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	18.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	12.7	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.15	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	7.34	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.05	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0056	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.146	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.665	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0059	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0009	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0402	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0225	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0819	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0490	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.122	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0074	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0445	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0077	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0032	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.136	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0964	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

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03-Sep-2009

DRAFT: EMR MT N2 Hour 48 Rep B - Total Metals
9061503-26 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	56.2	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000435	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.320	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	18.0	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	15.9	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	7.60	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.01	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.99	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.04	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0042	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.103	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.424	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0035	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0273	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0145	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0552	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0287	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0780	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0051	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0296	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0059	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0021	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.0964	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0756	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 48 Rep C - Total Metals
9061503-27 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	53.3	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000375	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.310	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	17.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	15.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	7.28	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	3.76	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.56	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.57	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0038	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.101	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.421	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0032	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0260	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0131	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0509	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0283	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0746	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0052	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0265	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0058	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0021	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.0880	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0667	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 48 Rep A - Total Metals
9061503-28 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	46.6	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000456	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.218	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	9.51	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	13.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	4.17	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	3.21	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	3.47	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.35	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0025	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.0673	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.277	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0020	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Cadmium	0.0008	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0179	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0085	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0341	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0163	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0589	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0037	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0187	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0047	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0014	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.0658	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0457	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 48 Rep B - Total Metals
9061503-29 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	42.9	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000429	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.179	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	6.60	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	12.5	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	2.91	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	2.86	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	2.73	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.29	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0018	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Arsenic	0.0516	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.211	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0015	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Cadmium	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Chromium	0.0133	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0062	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0256	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0109	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0436	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0030	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0137	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0026	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0011	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.0502	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0410	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 48 Rep C - Total Metals
9061503-30 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	60.2	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000557	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.390	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	24.3	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	16.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	9.95	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.40	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	6.04	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.92	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0043	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.114	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.546	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0046	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0348	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0193	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0696	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0384	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.112	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0059	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0390	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0071	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0026	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.124	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0810	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 48 Rep A - Total Metals
9061503-31 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	104	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000134	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.611	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	10.9	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	32.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	4.80	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.85	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.02	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.86	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0085	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.112	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.266	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0020	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0184	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0084	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0344	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0169	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0801	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0750	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0193	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0074	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0016	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.100	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0589	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 48 Rep B - Total Metals
9061503-32 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	105	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000093	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.623	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	11.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	32.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	4.84	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.94	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.17	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	5.07	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0083	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.112	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.263	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0019	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Cadmium	0.00067	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0178	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0087	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0316	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0158	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0853	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0751	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0198	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0080	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0015	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.100	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0461	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 48 Rep C - Total Metals
9061503-33 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	108	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000197	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.630	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	11.3	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	33.3	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	4.90	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.03	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.09	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.94	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0086	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.111	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.272	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0020	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0006	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0178	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0085	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0326	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0176	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0784	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0785	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0192	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0075	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0016	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.102	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0721	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 48 Rep A - Total Metals
9061503-34 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	105	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000356	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.617	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	11.9	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	32.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	5.20	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.96	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.82	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	5.15	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0084	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.114	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.276	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0021	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0206	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0087	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0361	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0171	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0835	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0759	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0210	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0088	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0018	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.104	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0496	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 48 Rep B - Total Metals
9061503-35 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	108	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.00034	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.645	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	15.3	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	32.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	6.70	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.27	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.92	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.89	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0087	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.125	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.321	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0026	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0230	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0112	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0428	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0212	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0969	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0770	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0241	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0093	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0020	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Vanadium	0.115	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0565	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 48 Rep C - Total Metals
9061503-36 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	109	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000277	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.651	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	16.7	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	33.0	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	7.29	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.39	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.14	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.65	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0088	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Arsenic	0.130	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Barium	0.336	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Beryllium	0.0028	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cadmium	0.0007	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	J
Chromium	0.0229	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Cobalt	0.0119	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Copper	0.0435	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B
Lead	0.0228	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Manganese	0.0985	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Molybdenum	0.0767	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Nickel	0.0258	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Selenium	0.0093	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	U
Thallium	0.0020	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Vanadium	0.118	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	
Zinc	0.0541	0.0020	mg/L	4	17-Jun-2009	17-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 96 Rep A
9061701-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	42.8	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.171	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0542	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	13.1	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.45	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.41	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.58	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0017	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Arsenic	0.0508	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.109	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Chromium	0.0012	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Copper	0.0025	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Manganese	0.0012	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0022	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0008	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Selenium	0.0034	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	0.0008	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J, B
Thallium	0.0005	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Vanadium	0.0298	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0058	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT N2 Hour 96 Rep A

9061701-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Chloride	2.71	1.00	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Nitrate as N	0.399	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Sulfate	13.0	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 96 Rep B
9061701-02 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	42.2	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000024	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.171	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0584	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	12.9	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.42	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.42	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.84	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0025	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Arsenic	0.0494	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.109	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Chromium	0.0013	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Copper	0.0023	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Manganese	0.0012	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0022	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.00062	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Selenium	0.0040	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	0.0003	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J, B
Thallium	0.0006	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Vanadium	0.0297	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0049	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT N2 Hour 96 Rep B

9061701-02 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Chloride	2.88	1.00	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Nitrate as N	0.414	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Sulfate	12.9	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 96 Rep C
9061701-03 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	42.4	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.172	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Calcium	13.0	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.44	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.50	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.73	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0016	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Arsenic	0.0502	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.107	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Chromium	0.0013	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Copper	0.0026	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Manganese	0.0012	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0022	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0007	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Selenium	0.0037	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Vanadium	0.0310	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0052	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT N2 Hour 96 Rep C

9061701-03 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0
Chloride	2.68	1.00	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0
Nitrate as N	0.393	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0
Sulfate	12.9	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 96 Rep A
9061701-04 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	40.5	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.156	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0591	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	12.3	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.39	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.37	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.57	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0015	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Arsenic	0.0428	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.105	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Chromium	0.0011	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Copper	0.0022	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Manganese	0.0017	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0020	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Selenium	0.0031	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0005	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Vanadium	0.0266	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0053	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT O2 Hour 96 Rep A

9061701-04 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Chloride	2.40	1.00	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Nitrate as N	0.174	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Sulfate	12.5	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	



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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 96 Rep B
9061701-05 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	41.2	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.163	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0529	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	12.6	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.36	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.39	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.53	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0015	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Arsenic	0.0457	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.114	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Chromium	0.0012	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Copper	0.0020	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Manganese	0.0014	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0020	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0005	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Selenium	0.0036	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.00057	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Vanadium	0.0286	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0056	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT O2 Hour 96 Rep B

9061701-05 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0
Chloride	2.43	1.00	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0
Nitrate as N	0.220	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0
Sulfate	12.6	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0



USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 96 Rep C

9061701-06 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	41.2	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.159	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0588	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	12.5	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.43	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.45	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.61	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0013	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Arsenic	0.0432	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.111	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Chromium	0.0012	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Copper	0.0023	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Manganese	0.0015	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0020	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Selenium	0.0033	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.00055	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Vanadium	0.0285	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0054	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: EMR MT O2 Hour 96 Rep C

9061701-06 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Chloride	2.52	1.00	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Nitrate as N	0.348	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Sulfate	12.6	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 96 Rep A
9061701-07 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	101	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.550	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0956	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	31.5	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.33	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	2.01	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.26	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0089	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Arsenic	0.0851	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.105	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0004	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Cobalt	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Copper	0.0014	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Manganese	0.0088	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0728	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0007	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Selenium	0.0098	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0008	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Vanadium	0.0516	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0056	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT N2 Hour 96 Rep A
9061701-07 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Chloride	3.90	1.00	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Nitrate as N	0.390	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 96 Rep B
9061701-08 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	100	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.551	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.112	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	31.5	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.30	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.94	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.16	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0090	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Arsenic	0.0841	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.106	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Cadmium	0.0004	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0004	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Cobalt	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Copper	0.0010	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Manganese	0.0089	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0732	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Selenium	0.0091	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0008	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Vanadium	0.0512	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0050	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 96 Rep B
9061701-08 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Chloride	3.79	1.00	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Nitrate as N	0.377	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 96 Rep C
9061701-09 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	100	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.549	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.110	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	31.4	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.26	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.95	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.16	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0090	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Arsenic	0.0874	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.106	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0004	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Cobalt	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Copper	0.0012	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Manganese	0.0089	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0740	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Selenium	0.0097	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0008	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Vanadium	0.0527	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0048	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 96 Rep C
9061701-09 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Chloride	3.86	1.00	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Nitrate as N	0.374	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 96 Rep A
9061701-10 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	101	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.550	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0733	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	31.6	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.28	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	2.03	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.33	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0088	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Arsenic	0.0800	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.109	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0004	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Cobalt	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Copper	0.0012	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Manganese	0.0114	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0725	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Selenium	0.0085	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0008	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Vanadium	0.0490	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0055	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 96 Rep A
9061701-10 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Chloride	4.08	1.00	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Nitrate as N	0.374	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 96 Rep B
9061701-11 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	101	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.552	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0732	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	31.6	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.34	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.98	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.29	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0088	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Arsenic	0.0834	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.110	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0004	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Cobalt	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Copper	0.0012	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Manganese	0.0102	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0720	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.00064	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Selenium	0.0098	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0009	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Vanadium	0.0527	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0057	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 96 Rep B
9061701-11 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Chloride	3.97	1.00	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Nitrate as N	0.377	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 96 Rep C
9061701-12 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	102	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.555	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0652	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	31.9	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.32	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	2.00	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.23	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0090	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Arsenic	0.0824	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.111	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0005	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Cobalt	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Copper	0.0016	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Manganese	0.0105	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0727	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0008	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Selenium	0.0098	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0009	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Vanadium	0.0515	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0052	0.0010	mg/L	2	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT O2 Hour 96 Rep C
9061701-12 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Bromide	ND	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Chloride	3.93	1.00	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	
Nitrate as N	0.389	0.100	mg/L	1	15-Jul-2009	16-Jul-2009	EPA 300.0	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 96 Rep A - Total Metals
9061701-13 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	91.5	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000177	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.707	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	55.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	24.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	21.9	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	7.33	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	11.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.58	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0149	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B
Arsenic	0.182	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	1.02	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	0.0087	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cadmium	0.0013	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0524	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	0.0358	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Copper	0.120	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	0.0975	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Manganese	0.124	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0095	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0701	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Selenium	0.0098	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	0.0010	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Thallium	0.0050	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Vanadium	0.184	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.146	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 96 Rep B - Total Metals
9061701-14 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	70.2	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000163	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.477	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	32.9	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	19.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	13.5	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.28	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	7.50	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.10	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0051	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B
Arsenic	0.140	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.661	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	0.0058	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cadmium	0.0018	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0419	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	0.0252	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Copper	0.0852	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	0.0619	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Manganese	0.0962	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0071	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0488	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Selenium	0.0088	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	0.0005	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Thallium	0.0034	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Vanadium	0.144	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.108	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 96 Rep C - Total Metals
9061701-15 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	76.6	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000176	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.569	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	40.7	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	21.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	16.9	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.82	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	8.79	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.09	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0112	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B
Arsenic	0.164	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.824	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	0.0070	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cadmium	0.0011	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0485	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	0.0315	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Copper	0.103	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	0.0792	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Manganese	0.111	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0082	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0617	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Selenium	0.0093	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	0.0008	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Thallium	0.0041	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Vanadium	0.170	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.130	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 96 Rep A - Total Metals
9061701-16 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	67.6	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000127	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.462	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	32.7	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	18.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	13.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	5.15	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	7.32	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.71	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0048	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B
Arsenic	0.130	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.668	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	0.0060	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cadmium	0.0010	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0434	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	0.0256	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Copper	0.0859	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	0.0623	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Manganese	0.0926	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0067	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0501	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Selenium	0.0074	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	0.0006	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Thallium	0.0034	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Vanadium	0.143	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.100	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 96 Rep B - Total Metals
9061701-17 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	66.8	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000147	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.447	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	30.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	18.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	12.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.95	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	6.80	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.65	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0042	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B
Arsenic	0.130	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.635	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	0.0054	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cadmium	0.0010	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0411	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	0.0236	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Copper	0.0790	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	0.0561	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Manganese	0.0917	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0067	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0457	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Selenium	0.0076	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	0.0005	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Thallium	0.0033	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Vanadium	0.135	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0951	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 96 Rep C - Total Metals
9061701-18 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	64.3	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000132	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.418	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	27.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	18.0	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	11.3	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.73	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	6.43	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.93	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0055	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B
Arsenic	0.120	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.580	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	0.0054	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cadmium	0.0008	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0383	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	0.0222	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Copper	0.0766	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	0.0551	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Manganese	0.0866	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0061	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0431	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Selenium	0.0072	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	0.0006	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Thallium	0.0031	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Vanadium	0.132	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.104	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 96 Rep A - Total Metals
9061701-19 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	110	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000078	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.673	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	18.0	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	33.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	7.86	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.48	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.35	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.84	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0079	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B
Arsenic	0.131	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.363	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	0.0032	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cadmium	0.0008	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0259	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	0.0147	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Copper	0.0752	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	0.0345	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Manganese	0.0750	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0747	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0432	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Selenium	0.0095	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0023	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Vanadium	0.129	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0808	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
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Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 96 Rep B - Total Metals
9061701-20 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	112	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000047	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.694	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	20.0	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	33.9	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	8.68	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.69	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.75	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.84	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0083	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B
Arsenic	0.137	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.392	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	0.0035	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cadmium	0.0011	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0263	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	0.0157	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Copper	0.0549	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	0.0376	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Manganese	0.0807	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0764	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0329	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Selenium	0.0089	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0025	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Vanadium	0.135	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0804	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 96 Rep C - Total Metals
9061701-21 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	109	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000039	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.657	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	15.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	33.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	6.87	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.35	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.79	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.65	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0082	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B
Arsenic	0.122	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.339	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	0.0028	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cadmium	0.0008	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0217	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	0.0130	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Copper	0.0460	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	0.0309	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Manganese	0.0685	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0758	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0277	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Selenium	0.0087	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0022	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Vanadium	0.125	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0729	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 96 Rep A - Total Metals
9061701-22 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	109	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000188	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.662	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	17.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	33.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	7.73	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.43	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.29	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.78	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0073	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B
Arsenic	0.125	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.342	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	0.0031	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cadmium	0.00081	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0240	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	0.0139	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Copper	0.0492	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	0.0325	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Manganese	0.0768	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0753	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0301	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Selenium	0.0088	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0023	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Vanadium	0.126	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0850	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 96 Rep B - Total Metals
9061701-23 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	111	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000063	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.671	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	17.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	33.7	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	7.50	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.49	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.19	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.79	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0083	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B
Arsenic	0.128	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.364	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	0.0030	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cadmium	0.0008	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0262	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	0.0135	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Copper	0.0485	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	0.0370	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Manganese	0.0740	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0776	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0310	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Selenium	0.0092	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0024	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Vanadium	0.126	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0916	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 96 Rep C - Total Metals
9061701-24 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	114	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000098	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.704	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	20.5	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	34.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	8.83	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.77	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.90	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.98	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0082	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B
Arsenic	0.136	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Barium	0.394	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Beryllium	0.0037	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cadmium	0.0009	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	J
Chromium	0.0344	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Cobalt	0.0159	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Copper	0.0566	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Lead	0.0379	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Manganese	0.0933	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Molybdenum	0.0786	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Nickel	0.0365	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Selenium	0.0098	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	U
Thallium	0.0025	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Vanadium	0.140	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	
Zinc	0.0907	0.0020	mg/L	4	19-Jun-2009	19-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 240 Rep A

9062302-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	47.0	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000037	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	
Strontium	0.199	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.123	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	14.5	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.63	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.51	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.69	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0022	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Arsenic	0.0633	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.123	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Chromium	0.0018	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Copper	0.0011	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Manganese	0.0005	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Molybdenum	0.0027	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0004	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Selenium	0.0064	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Vanadium	0.0387	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0041	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:
03-Sep-2009

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Project Manager: Tony Bednar

DRAFT: EMR MT N2 Hour 240 Rep A

9062302-01 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Total Dissolved Solids	155	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.1	
Total Solids	630	10.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	
Total Suspended Solids	475	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	



USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 240 Rep B

9062302-02 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	47.2	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.203	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.130	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	14.5	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	0.0532	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Magnesium	2.65	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.55	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.98	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0026	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Arsenic	0.0634	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.129	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Chromium	0.0019	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Copper	0.0010	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Manganese	0.00051	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Molybdenum	0.0029	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0004	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Selenium	0.0064	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Vanadium	0.0382	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0035	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 240 Rep B
9062302-02 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Total Dissolved Solids	165	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.1	
Total Solids	560	10.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	
Total Suspended Solids	395	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 240 Rep C

9062302-03 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	48.2	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.208	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.101	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	14.9	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.70	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.66	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	3.04	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0022	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Arsenic	0.0657	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.127	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Chromium	0.0019	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Copper	0.0014	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Manganese	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Molybdenum	0.0029	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0005	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Selenium	0.0066	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0007	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Vanadium	0.0399	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0036	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 240 Rep C
9062302-03 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Total Dissolved Solids	225	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.1	
Total Solids	630	10.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	
Total Suspended Solids	405	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 240 Rep A
9062302-04 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	44.2	1.32	mg equil CaCO3/ L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.182	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0944	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	13.6	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.52	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.48	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.64	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0017	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Arsenic	0.0533	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.119	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Chromium	0.0019	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Copper	0.0010	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Manganese	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Molybdenum	0.0025	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0004	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Selenium	0.0059	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Vanadium	0.0341	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0038	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 240 Rep A
9062302-04 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Total Dissolved Solids	140	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.1	
Total Solids	700	10.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	
Total Suspended Solids	560	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 240 Rep B

9062302-05 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	44.2	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.184	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0891	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	13.6	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.51	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.41	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.52	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0016	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Arsenic	0.0539	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.120	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Chromium	0.0019	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Copper	0.0007	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Manganese	0.0012	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Molybdenum	0.0025	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0005	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Selenium	0.0056	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0005	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Vanadium	0.0341	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0033	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 240 Rep B
9062302-05 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Total Dissolved Solids	115	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.1	
Total Solids	650	10.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	
Total Suspended Solids	535	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 240 Rep C

9062302-06 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	44.3	1.32	mg equil CaCO3/ L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.182	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.0868	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	13.6	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	2.52	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.43	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	2.57	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0017	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Arsenic	0.0518	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.126	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Cadmium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Chromium	0.0017	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Copper	0.0010	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Manganese	0.0007	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Molybdenum	0.0023	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0004	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Selenium	0.0049	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0005	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Vanadium	0.0340	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0038	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:
03-Sep-2009

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Project Manager: Tony Bednar

DRAFT: EMR MT O2 Hour 240 Rep C
9062302-06 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Total Dissolved Solids	110	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.1	
Total Solids	535	10.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	
Total Suspended Solids	425	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 240 Rep A
9062302-07 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	105	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.572	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.170	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	32.7	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.59	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	2.14	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.48	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0096	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Arsenic	0.0848	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.113	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Cobalt	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Copper	0.0002	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Manganese	0.0005	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Molybdenum	0.0796	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0007	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Selenium	0.0121	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Vanadium	0.0540	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0030	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: SLC MT N2 Hour 240 Rep A
9062302-07 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Total Dissolved Solids	255	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.1	
Total Solids	670	10.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	
Total Suspended Solids	415	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 240 Rep B
9062302-08 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	103	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	01-Jul-2009	EPA 7471A	U
Strontium	0.569	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.166	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	32.3	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.38	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.93	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.26	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0095	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Arsenic	0.0850	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.109	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Cobalt	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Copper	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Lead	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Manganese	0.0005	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Molybdenum	0.0790	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0040	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.0130	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0005	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Vanadium	0.0534	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0033	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 240 Rep B
9062302-08 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Total Dissolved Solids	185	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.1	
Total Solids	600	10.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	
Total Suspended Solids	415	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 240 Rep C
9062302-09 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	104	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	02-Jul-2009	EPA 7471A	U
Strontium	0.569	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.171	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	32.5	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.46	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.99	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.30	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0096	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Arsenic	0.0850	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.110	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Cobalt	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Copper	0.00025	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Manganese	0.0005	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Molybdenum	0.0801	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Selenium	0.0128	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0005	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Vanadium	0.0544	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0035	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 240 Rep C
9062302-09 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Total Dissolved Solids	230	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.1	
Total Solids	640	10.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	
Total Suspended Solids	410	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 240 Rep A
9062302-10 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	104	1.32	mg equil CaCO ₃ / L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	02-Jul-2009	EPA 7471A	U
Strontium	0.575	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.116	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	32.7	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.35	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	2.04	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.48	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0098	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Arsenic	0.0798	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.117	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0007	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Cobalt	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Copper	0.0003	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Manganese	0.00065	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Molybdenum	0.0787	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Selenium	0.0126	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Vanadium	0.0532	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0041	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 240 Rep A
9062302-10 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Total Dissolved Solids	185	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.1	
Total Solids	640	10.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	
Total Suspended Solids	455	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 240 Rep B
9062302-11 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	104	1.32	mg equil CaCO3/ L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	02-Jul-2009	EPA 7471A	U
Strontium	0.574	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.124	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	32.8	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.37	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	1.98	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.32	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0094	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Arsenic	0.0812	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.115	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Cadmium	0.0003	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0007	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Cobalt	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Copper	0.0003	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Manganese	0.0005	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Molybdenum	0.0778	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Selenium	0.0128	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.00059	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Vanadium	0.0529	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0033	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 240 Rep B
9062302-11 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Total Dissolved Solids	225	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.1	
Total Solids	660	10.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	
Total Suspended Solids	435	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 240 Rep C
9062302-12 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	106	1.32	mg equil CaCO3/ L	1	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.000005	mg/L	1	17-Jun-2009	02-Jul-2009	EPA 7471A	U
Strontium	0.580	0.0200	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	0.123	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	J
Calcium	33.1	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Iron	ND	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	U
Magnesium	5.54	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	2.04	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Sodium	4.33	0.200	mg/L	1	25-Jun-2009	25-Jun-2009	SW 846/6010	
Antimony	0.0098	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Arsenic	0.0829	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.118	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Cadmium	0.0004	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0007	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Cobalt	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Copper	0.0003	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Lead	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Manganese	0.0005	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Molybdenum	0.0801	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Selenium	0.0128	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0006	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Vanadium	0.0520	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0036	0.0010	mg/L	2	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 240 Rep C
9062302-12 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters

Total Dissolved Solids	225	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.1	
Total Solids	740	10.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	
Total Suspended Solids	515	25.0	mg/L	1	25-Jun-2009	25-Jun-2009	EPA 160.2	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 240 Rep A - Total Metals
9062302-13 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	66.5	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000205	0.000005	mg/L	2	24-Jul-2009	24-Jul-2009	EPA 7471A	
Strontium	0.441	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	22.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	19.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	8.97	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.51	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.98	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.11	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0069	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	0.132	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.556	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	0.0033	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.0005	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0245	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	0.0142	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	0.0516	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	0.0399	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	0.0774	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Molybdenum	0.0067	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0262	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.0072	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	0.0004	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Thallium	0.0028	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	0.106	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0678	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 240 Rep B - Total Metals
9062302-14 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	64.6	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.00013	0.000005	mg/L	1	24-Jul-2009	20-Aug-2009	EPA 7471A	
Strontium	0.417	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	19.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	18.7	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	8.03	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.34	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.71	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.36	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0052	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	0.120	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.524	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	0.0029	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.0006	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0238	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	0.0133	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	0.0474	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	0.0353	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	0.0695	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Molybdenum	0.0064	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0270	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.0077	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0026	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	0.103	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0685	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT N2 Hour 240 Rep C - Total Metals
9062302-15 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	69.6	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000175	0.000005	mg/L	1	24-Jul-2009	20-Aug-2009	EPA 7471A	
Strontium	0.454	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	22.5	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	20.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	9.19	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.68	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.29	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.52	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0053	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	0.136	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.577	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	0.0036	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.00069	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0253	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	0.0144	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	0.0605	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	0.0410	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	0.0803	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Molybdenum	0.0071	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0275	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.0086	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	0.0004	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Thallium	0.0029	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	0.112	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0727	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 240 Rep A - Total Metals
9062302-16 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	68.4	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000155	0.000005	mg/L	1	24-Jul-2009	20-Aug-2009	EPA 7471A	
Strontium	0.465	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	25.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	19.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	10.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.76	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.53	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.21	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0051	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	0.129	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.608	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	0.0037	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.0006	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0265	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	0.0156	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	0.0561	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	0.0448	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	0.0790	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Molybdenum	0.0070	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0291	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.0070	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	0.0004	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Thallium	0.0030	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	0.110	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0732	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 240 Rep B - Total Metals
9062302-17 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	69.0	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000171	0.000005	mg/L	1	24-Jul-2009	20-Aug-2009	EPA 7471A	
Strontium	0.458	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	25.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	19.7	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	10.1	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.84	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.48	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.09	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0049	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	0.126	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.591	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	0.0035	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.0006	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0270	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	0.0157	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	0.0547	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	0.0431	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	0.0776	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Molybdenum	0.0069	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0288	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.0073	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	0.00041	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Thallium	0.0028	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	0.108	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0718	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR MT O2 Hour 240 Rep C - Total Metals
9062302-18 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	62.9	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000167	0.000005	mg/L	1	24-Jul-2009	20-Aug-2009	EPA 7471A	
Strontium	0.402	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	19.3	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	18.3	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	7.79	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	4.21	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.52	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	3.07	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0046	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	0.112	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.509	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	0.0029	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.0005	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0233	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	0.0131	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	0.0475	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	0.0361	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	0.0684	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Molybdenum	0.0059	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0252	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.0065	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0026	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	0.0968	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0654	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 240 Rep A - Total Metals
9062302-19 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	121	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000158	0.000005	mg/L	1	24-Jul-2009	20-Aug-2009	EPA 7471A	
Strontium	0.777	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	20.5	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	36.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	9.17	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	7.15	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	5.57	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.82	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0105	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	0.156	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.448	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	0.0027	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.0009	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0246	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	0.0131	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	0.0498	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	0.0365	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	0.0915	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Molybdenum	0.0852	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0267	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.0115	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0028	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	0.129	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0685	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 240 Rep B - Total Metals
9062302-20 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	118	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000148	0.000005	mg/L	1	24-Jul-2009	20-Aug-2009	EPA 7471A	
Strontium	0.751	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	17.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	36.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	7.98	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.75	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.94	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.59	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0102	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	0.147	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.406	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	0.0026	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.0009	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0220	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	0.0121	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	0.0455	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	0.0319	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	0.0836	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Molybdenum	0.0862	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0250	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.0124	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0025	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	0.125	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0662	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT N2 Hour 240 Rep C - Total Metals
9062302-21 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	112	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000118	0.000005	mg/L	1	24-Jul-2009	20-Aug-2009	EPA 7471A	
Strontium	0.709	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	17.3	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	34.2	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	7.83	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.48	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.78	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.35	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0096	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	0.142	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.399	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	0.0023	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.0008	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0212	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	0.0119	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	0.0438	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	0.0310	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	0.0798	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Molybdenum	0.0800	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0238	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.0110	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0024	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	0.120	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0669	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 240 Rep A - Total Metals
9062302-22 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	116	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000182	0.000005	mg/L	1	24-Jul-2009	20-Aug-2009	EPA 7471A	
Strontium	0.735	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	16.9	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	35.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	7.71	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.59	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.85	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.68	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0099	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	0.145	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.406	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	0.0025	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.0009	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0212	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	0.0114	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	0.0434	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	0.0297	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	0.0851	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Molybdenum	0.0839	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0232	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.0111	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0026	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	0.119	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0638	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 240 Rep B - Total Metals
9062302-23 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	119	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000189	0.000005	mg/L	1	24-Jul-2009	20-Aug-2009	EPA 7471A	
Strontium	0.759	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	17.8	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	36.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	8.06	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	6.77	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	4.99	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.69	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0104	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	0.149	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.429	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	0.0026	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.0009	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0233	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	0.0124	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	0.0457	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	0.0321	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	0.0875	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Molybdenum	0.0837	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0253	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.0118	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0027	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	0.127	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0660	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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- -, -

Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: SLC MT O2 Hour 240 Rep C - Total Metals
9062302-24 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Wet Chemistry

Hardness	124	1.32	mg equil CaCO ₃ / L	4	25-Jun-2009	25-Jun-2009	Hardness	
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DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.000264	0.000005	mg/L	1	24-Jul-2009	20-Aug-2009	EPA 7471A	
Strontium	0.814	0.0800	mg/L	4	25-Jun-2009	25-Jun-2009	EPA 6010B	
Aluminum	24.4	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Calcium	37.6	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Iron	11.0	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Magnesium	7.33	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	
Potassium	6.13	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Sodium	4.74	0.200	mg/L	4	25-Jun-2009	25-Jun-2009	SW 846/6010	B
Antimony	0.0105	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B
Arsenic	0.171	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Barium	0.512	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Beryllium	0.0033	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cadmium	0.0011	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	J
Chromium	0.0268	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Cobalt	0.0154	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Copper	0.0563	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Lead	0.0415	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Manganese	0.103	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Molybdenum	0.0855	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Nickel	0.0308	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Selenium	0.0131	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Silver	ND	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	U
Thallium	0.0031	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Vanadium	0.139	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	
Zinc	0.0746	0.0020	mg/L	4	26-Jun-2009	26-Jun-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 100 - A
9071602-01 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.029	0.005	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	1080	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	0.141	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Arsenic	2.89	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	29.5	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	0.167	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Cadmium	0.393	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	4740	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	16.5	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	1.09	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Copper	4.87	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	584	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	1.83	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	360	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	6.31	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.458	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	9.52	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2650	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.709	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Silver	0.462	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Sodium	1010	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	0.195	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Vanadium	4.12	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	24.8	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 100 - B

9071602-02 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.027	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	1450	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	0.435	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Arsenic	4.35	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	27.3	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	0.222	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Cadmium	0.532	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Calcium	5210	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	7.38	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	1.14	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Copper	5.14	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	737	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	2.41	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	380	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	7.28	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.367	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	5.07	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2520	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.639	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	996	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	0.270	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Vanadium	5.81	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	29.1	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 100 - C

9071602-03 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.017	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	756	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	0.876	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Arsenic	2.38	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	15.1	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	0.121	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Cadmium	0.324	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	4610	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	6.71	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.685	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Copper	3.22	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	393	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	1.11	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	311	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	4.27	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.265	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	4.24	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2370	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.505	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	946	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	0.204	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Vanadium	3.19	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	23.3	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 100 - D

9071602-04 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.022	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	914	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	0.723	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Arsenic	2.93	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	18.2	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	0.149	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Cadmium	0.408	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	5920	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	7.55	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.789	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Copper	4.32	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	492	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	1.41	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	369	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	5.35	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.300	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	4.72	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2800	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.592	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	1080	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	0.213	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Vanadium	3.94	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	32.7	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 100 - E

9071602-05 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.020	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	511	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	1.64	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	11.1	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	0.291	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	5050	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	2.44	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.421	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Copper	2.78	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	279	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	1.08	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	299	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	2.87	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.148	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	1.86	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2590	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.465	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	938	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	0.168	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Vanadium	2.35	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	24.9	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 50 - A
9071602-06 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.022	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	1020	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	0.123	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Arsenic	3.18	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	19.6	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	0.173	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Cadmium	0.353	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	5530	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	4.83	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.845	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Copper	4.41	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	551	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	1.58	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	344	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	5.97	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.278	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	3.51	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2730	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.526	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Silver	0.175	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Sodium	993	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	0.170	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Vanadium	4.41	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	26.7	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 50 - B

9071602-07 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.020	0.004	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	601	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	1.83	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	11.5	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	0.104	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Cadmium	0.268	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	4990	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	9.17	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.577	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Copper	3.05	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	342	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.901	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	294	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	4.04	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.356	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	5.12	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2280	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.444	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	939	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	0.113	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Vanadium	2.69	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	27.2	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 50 - C
9071602-08 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.023	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	1210	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	0.134	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Arsenic	3.69	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	23.5	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	0.205	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Cadmium	0.444	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	5950	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	5.19	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	1.02	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Copper	4.48	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	646	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	1.87	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	369	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	7.14	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.298	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	4.13	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2440	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.566	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Silver	0.104	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Sodium	953	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	0.162	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Vanadium	4.93	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	29.7	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 50 - D

9071602-09 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.019	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	798	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	2.56	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	15.6	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	0.136	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Cadmium	0.339	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	5490	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	3.97	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.665	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Copper	3.30	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	433	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	1.22	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	328	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	4.47	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.215	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	2.90	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2590	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.475	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	982	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	0.131	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Vanadium	3.54	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	26.9	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 50 - E
9071602-10 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.029	0.003	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	1150	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	0.125	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Arsenic	3.50	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	22.5	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	0.196	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Cadmium	0.436	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	5870	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	4.08	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.961	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Copper	5.20	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	616	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	1.80	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	355	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	6.50	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.262	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	3.49	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2450	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.535	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Silver	0.104	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Sodium	992	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	0.172	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Vanadium	4.71	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	28.6	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 10 - A
9071602-11 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.020	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	236	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	0.902	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	5.61	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	0.115	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	6270	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	6.00	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.251	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Copper	1.75	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	160	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.462	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Magnesium	302	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	2.55	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.199	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	3.20	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2500	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.358	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	965	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	0.907	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	26.5	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 10 - B
9071602-12 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.016	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	475	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	1.32	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	9.27	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	0.127	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	5990	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	3.85	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.399	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Copper	2.10	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	277	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	1.03	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	306	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	3.41	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.176	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	2.41	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2470	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.360	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	1010	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	1.77	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	27.8	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 10 - C
9071602-13 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.015	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	339	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	1.07	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	7.08	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	0.112	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	5140	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	10.4	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.368	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Copper	2.62	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	255	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.620	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	268	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	3.54	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.588	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Nickel	4.93	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2110	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.303	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	882	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	1.43	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	25.5	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 10 - D
9071602-14 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.018	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	511	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	0.540	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Arsenic	1.42	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	10.1	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	0.146	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	5550	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	2.62	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.436	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Copper	2.62	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	289	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	1.20	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	286	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	3.75	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.153	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	1.92	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2370	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.369	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	937	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	1.92	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	28.0	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 10 - E
9071602-15 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.018	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	442	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	1.36	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	8.96	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	0.130	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	5880	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	4.63	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.402	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Copper	2.13	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	262	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.755	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	305	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	3.80	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.173	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	2.91	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2420	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.353	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	933	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	1.69	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Zinc	27.8	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 0 - A
9071602-16 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.014	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	33.9	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	0.360	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Barium	2.62	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Calcium	5920	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	1.92	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Copper	1.02	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	71.6	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.510	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	261	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	3.52	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Nickel	1.13	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2310	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.252	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	913	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	0.115	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Zinc	27.7	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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- -, -

Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 0 - B
9071602-17 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.014	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	11.8	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	0.379	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Barium	1.73	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Calcium	4520	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	3.01	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Copper	1.13	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	43.0	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Magnesium	247	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	1.88	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Nickel	1.50	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2340	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.282	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	872	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Zinc	25.6	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 0 - C
9071602-18 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.017	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	22.1	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	0.342	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Barium	2.01	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Calcium	5270	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	1.38	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Copper	1.27	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	62.5	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.278	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Magnesium	261	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	2.94	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Nickel	0.600	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2350	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.267	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	0.647	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Sodium	880	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Zinc	28.1	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 0 - D
9071602-19 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.020	0.003	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	27.0	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	0.328	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Barium	2.64	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Calcium	5230	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	2.18	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Copper	1.31	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	68.4	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.524	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	262	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	3.38	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.101	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	1.07	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2230	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.229	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	931	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	0.112	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Zinc	24.9	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: EMR - EL - AF - 0 - E
9071602-20 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.019	0.003	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	33.0	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	0.169	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Arsenic	0.425	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Barium	3.01	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Calcium	6780	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	9.15	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.121	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Copper	1.77	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	110	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.436	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Magnesium	299	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	5.32	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.215	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	4.25	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2290	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.301	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	991	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	0.179	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Zinc	33.6	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Control - A
9071602-21 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.013	0.001	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	8.11	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	0.152	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Barium	1.83	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Calcium	6000	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	2.06	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Copper	0.979	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	37.2	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.192	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Magnesium	283	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	1.15	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Nickel	1.03	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2400	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.260	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	924	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Zinc	27.8	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Control - B
9071602-22 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.017	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	11.4	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	0.114	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Barium	1.93	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Calcium	5920	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	1.41	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Copper	1.04	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	34.0	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.248	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Magnesium	263	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	1.36	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Nickel	0.651	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2240	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.244	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	1010	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	0.120	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Zinc	25.4	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Control - C

9071602-23 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.015	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	15.6	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	0.101	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Barium	2.00	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Calcium	5680	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	3.70	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Copper	1.21	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	39.8	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.324	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Magnesium	262	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	1.52	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.100	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	1.78	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2220	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.248	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	962	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Zinc	25.3	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Control - D
9071602-24 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.016	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	13.4	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	0.110	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Barium	1.84	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Calcium	5710	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	1.35	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Copper	0.914	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	34.2	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.221	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Magnesium	252	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	1.18	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Nickel	0.504	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	2130	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.241	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	887	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Zinc	22.3	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Control - E

9071602-25 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.015	0.002	mg/kg	1	22-Jul-2009	22-Jul-2009	EPA 7471A	
Aluminum	7.01	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	0.812	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Arsenic	0.130	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Barium	1.55	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Calcium	5740	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	0.797	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Copper	1.22	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	31.9	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Magnesium	241	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	0.805	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Nickel	0.338	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Potassium	2020	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	0.220	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	874	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Zinc	23.9	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Larvae Food

9071602-26 (Solid)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Aluminum	23.7	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	14.3	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	2.21	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Calcium	1470	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	0.237	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Cobalt	0.280	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Copper	8.68	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	600	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.478	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Magnesium	2280	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	7.33	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.467	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	0.570	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	4850	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	2.15	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	2950	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	0.133	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Zinc	52.9	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Adult Food

9071602-27 (Solid)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Aluminum	32.3	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Antimony	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Arsenic	1.70	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Barium	3.17	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Beryllium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Cadmium	0.101	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Calcium	12300	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Chromium	5.50	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Cobalt	0.195	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Copper	16.9	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Iron	199	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Lead	0.523	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Magnesium	1630	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Manganese	42.6	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Molybdenum	0.446	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Nickel	1.07	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Potassium	7810	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Selenium	1.30	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Silver	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Sodium	5590	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	
Thallium	ND	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	U
Vanadium	0.357	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	J
Zinc	93.5	0.500	mg/kg	2	17-Jul-2009	20-Jul-2009	SW 846/6020	B

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Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: Fish Tissue Dechlor 1

9082706-01 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.007	0.003	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.101	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	2.28	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	6.45	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	0.104	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	1.62	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	1.52	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	1.51	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.124	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	4.68	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.158	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	0.193	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.094	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	19.0	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Tissue Dechlor 2
9082706-02 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.011	0.005	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.084	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	1.97	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	15.2	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	0.159	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	1.01	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	3.49	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	2.05	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.298	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	7.50	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.110	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	0.116	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.121	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	13.6	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Tissue Dechlor 3

9082706-03 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.007	0.004	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	1.84	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	1.79	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.663	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.588	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	0.742	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	1.20	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.087	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Zinc	22.5	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Tissue Dechlor 4
9082706-04 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.009	0.003	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	0.084	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	1.61	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	4.04	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.806	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.590	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	1.02	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.083	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	2.29	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.112	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.098	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	17.8	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



USACE ERDC-EP-C
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Tissue Dechlor 5
9082706-05 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.013	0.004	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.105	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	2.46	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	11.4	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	0.088	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	0.854	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.256	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	1.54	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.193	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	5.78	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.163	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	0.080	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.109	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	19.7	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Tissue EMR - WA 1

9082706-06 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.011	0.003	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	0.426	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Arsenic	0.184	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	4.15	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	9.76	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	0.136	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	2.13	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.414	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	2.00	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.203	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	5.05	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.229	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	0.156	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.259	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	39.0	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Tissue EMR - WA 2

9082706-07 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.013	0.004	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	0.247	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	0.112	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	3.26	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	3.25	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.846	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.502	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	0.995	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	2.11	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.245	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	0.119	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.245	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	25.3	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Tissue EMR - WA 3

9082706-08 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.010	0.004	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	0.205	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	0.083	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	1.96	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	7.14	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.722	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.480	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	1.17	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.110	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	3.66	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.108	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	0.238	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.096	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	16.0	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Tissue EMR - WA 4
9082706-09 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.006	0.003	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.099	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	4.02	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	8.94	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	0.097	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	1.33	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.392	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	1.70	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.156	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	4.78	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.208	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.123	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	19.6	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Tissue EMR - WA 5

9082706-10 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.015	0.006	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.119	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	3.31	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	12.6	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	0.092	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	0.994	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.414	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	2.11	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.194	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	6.22	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.240	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.160	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	26.1	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Tissue EMR - EL 1

9082706-11 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.013	0.005	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.493	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	4.18	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	2.74	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.992	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.356	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	1.21	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	1.65	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.294	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.669	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Zinc	28.6	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Tissue EMR - EL 2

9082706-12 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.013	0.005	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.470	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	4.03	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	2.97	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.847	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.305	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	1.12	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	1.72	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.335	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.386	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	28.8	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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03-Sep-2009

DRAFT: Fish Tissue EMR - EL 3

9082706-13 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.015	0.004	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	0.266	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	0.220	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	2.20	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	1.19	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	1.21	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.352	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	0.619	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	0.767	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.200	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.224	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	23.1	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Tissue EMR - EL 4

9082706-14 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	0.009	0.004	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.199	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	2.06	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	3.99	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.787	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.350	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	0.848	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	2.09	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.171	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.358	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	20.1	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Tissue EMR - EL 5

9082706-15 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.005	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	U
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.224	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	3.43	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	6.07	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.771	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.295	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	1.07	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	3.67	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.190	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.338	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	21.2	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut Dechlor 1
9082706-16 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	1060	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	1020	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	17.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	460	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	169	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	3090	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	66.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	13.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	28.0	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	2370	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut Dechlor 2
9082706-17 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	27.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	299	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	224	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	21.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	167	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	172	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	727	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	66.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	9.40	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	1080	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut Dechlor 3

9082706-18 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	210	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	184	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	107	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	77.5	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	586	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	25.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Zinc	700	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut Dechlor 4
9082706-19 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	358	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	272	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	566	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	96.0	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	987	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	53.6	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	14.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	1170	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut Dechlor 5
9082706-20 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	110	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	195	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	99.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	86.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	199	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	57.0	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Zinc	551	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut EMR - WA 1
9082706-21 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	348	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	94.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	135	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	90.7	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	488	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	31.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	16.9	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	12.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	1490	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut EMR - WA 2
9082706-22 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	218	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	48.8	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	83.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	66.5	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	231	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	32.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Zinc	869	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut EMR - WA 3
9082706-23 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	481	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	189	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	181	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	123	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	786	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	70.8	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	10.6	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	20.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	1670	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut EMR - WA 4
9082706-24 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	25.0	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	517	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	168	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	160	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	112	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	728	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	45.9	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	9.18	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	18.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	1620	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut EMR - WA 5
9082706-25 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	351	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	96.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	109	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	100	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	479	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	32.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	14.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	1280	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut EMR - EL 1
9082706-26 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	183	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	1280	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	10.9	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	138	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	55.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Copper	242	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	114	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	317	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	11.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	118	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	286	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Zinc	382	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Reported:
03-Sep-2009

DRAFT: Fish Gut EMR - EL 2
9082706-27 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	46.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Arsenic	1390	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	11100	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	93.6	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cadmium	60.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Chromium	1120	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	468	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Copper	2280	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	970	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	2710	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	94.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Nickel	1010	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	36.0	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	165	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Thallium	38.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Vanadium	2360	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Zinc	3570	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut EMR - EL 3

9082706-28 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	23.6	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	611	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	6140	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	51.8	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cadmium	34.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Chromium	611	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	252	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Copper	1170	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	550	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	1480	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	50.9	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Nickel	560	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	12.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	27.6	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	19.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Vanadium	1300	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Zinc	2440	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut EMR - EL 4
9082706-29 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	25.6	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	734	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	6380	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	53.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cadmium	32.0	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Chromium	625	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	261	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Copper	1180	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	1600	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	1520	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	52.5	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Nickel	580	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	20.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Vanadium	1340	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Zinc	2460	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Fish Gut EMR - EL 5
9082706-30 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

DRAFT: Metals by EPA 6000/7000 Series Methods

Antimony	15.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	127	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	1190	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	10.7	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	116	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	49.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Copper	217	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	107	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	281	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	10.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	107	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	243	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Zinc	474	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control
ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906047 - Default Prep Metals

Blank (B906047-BLK1)

Prepared & Analyzed: 16-Jun-2009

Antimony	0.0006	0.0010	mg/L							J
Arsenic	ND	0.0010	mg/L							U
Barium	ND	0.0010	mg/L							U
Beryllium	ND	0.0010	mg/L							U
Cadmium	ND	0.0010	mg/L							U
Chromium	ND	0.0010	mg/L							U
Cobalt	ND	0.0010	mg/L							U
Copper	0.0004	0.0010	mg/L							J
Lead	ND	0.0010	mg/L							U
Manganese	ND	0.0010	mg/L							U
Molybdenum	ND	0.0010	mg/L							U
Nickel	ND	0.0010	mg/L							U
Selenium	ND	0.0010	mg/L							U
Silver	0.0063	0.0010	mg/L							
Thallium	ND	0.0010	mg/L							U
Vanadium	ND	0.0010	mg/L							U
Zinc	0.0012	0.0010	mg/L							

Blank (B906047-BLK2)

Prepared: 16-Jun-2009 Analyzed: 30-Jun-2009

Antimony	ND	0.0010	mg/L							U
Arsenic	ND	0.0010	mg/L							U
Barium	ND	0.0010	mg/L							U
Beryllium	ND	0.0010	mg/L							U
Cadmium	ND	0.0010	mg/L							U
Chromium	ND	0.0010	mg/L							U
Cobalt	ND	0.0010	mg/L							U
Copper	ND	0.0010	mg/L							U
Lead	ND	0.0010	mg/L							U
Manganese	ND	0.0010	mg/L							U
Molybdenum	ND	0.0010	mg/L							U
Nickel	ND	0.0010	mg/L							U
Selenium	ND	0.0010	mg/L							U
Silver	ND	0.0010	mg/L							U
Thallium	ND	0.0010	mg/L							U
Vanadium	ND	0.0010	mg/L							U
Zinc	ND	0.0010	mg/L							U

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906047 - Default Prep Metals

LCS (B906047-BS1)

Prepared & Analyzed: 16-Jun-2009

Antimony	0.0246	0.0010	mg/L	0.02500		98.5	80-120			
Arsenic	0.0249	0.0010	mg/L	0.02500		99.6	80-120			
Barium	0.0254	0.0010	mg/L	0.02500		102	80-120			
Beryllium	0.0247	0.0010	mg/L	0.02500		98.9	80-120			
Cadmium	0.0246	0.0010	mg/L	0.02500		98.3	80-120			
Chromium	0.0262	0.0010	mg/L	0.02500		105	80-120			
Cobalt	0.0274	0.0010	mg/L	0.02500		110	80-120			
Copper	0.0259	0.0010	mg/L	0.02500		104	80-120			
Lead	0.0268	0.0010	mg/L	0.02500		107	80-120			
Manganese	0.0262	0.0010	mg/L	0.02500		105	80-120			
Molybdenum	0.0253	0.0010	mg/L	0.02500		101	80-120			
Nickel	0.0260	0.0010	mg/L	0.02500		104	80-120			
Selenium	0.0239	0.0010	mg/L	0.02500		95.6	80-120			
Silver	0.0287	0.0010	mg/L	0.02500		115	80-120			B
Thallium	0.0248	0.0010	mg/L	0.02500		99.4	80-120			
Vanadium	0.0266	0.0010	mg/L	0.02500		107	80-120			
Zinc	0.0250	0.0010	mg/L	0.02500		100	80-120			B

Duplicate (B906047-DUP1)

Source: 9061502-40

Prepared & Analyzed: 16-Jun-2009

Antimony	0.0005	0.0010	mg/L		0.0006		4.14	20		J
Arsenic	0.0348	0.0010	mg/L		0.0359		2.99	20		
Barium	0.0831	0.0010	mg/L		0.0879		5.54	20		
Beryllium	ND	0.0010	mg/L		ND			20		U
Cadmium	ND	0.0010	mg/L		ND			20		U
Chromium	ND	0.0010	mg/L		ND			20		U
Cobalt	ND	0.0010	mg/L		ND			20		U
Copper	0.0015	0.0010	mg/L		0.0014		5.19	20		
Lead	ND	0.0010	mg/L		ND			20		U
Manganese	0.0024	0.0010	mg/L		0.0033		30.0	20		
Molybdenum	0.0017	0.0010	mg/L		0.0018		5.01	20		
Nickel	0.0006	0.0010	mg/L		0.0006		4.41	20		J
Selenium	0.0013	0.0010	mg/L		0.0013		3.22	20		
Silver	ND	0.0010	mg/L		ND			20		U
Thallium	0.0003	0.0010	mg/L		0.0004		19.2	20		J
Vanadium	0.0235	0.0010	mg/L		0.0235		0.126	20		
Zinc	0.0055	0.0010	mg/L		0.0060		8.81	20		B

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906047 - Default Prep Metals

Matrix Spike (B906047-MS1)

Source: 9061502-40

Prepared & Analyzed: 16-Jun-2009

Antimony	0.0399	0.0010	mg/L	0.04000	0.0006	98.4	80-120			
Arsenic	0.0764	0.0010	mg/L	0.04000	0.0359	101	80-120			
Barium	0.124	0.0010	mg/L	0.04000	0.0879	89.3	80-120			
Beryllium	0.0439	0.0010	mg/L	0.04000	ND	110	80-120			
Cadmium	0.0396	0.0010	mg/L	0.04000	ND	98.9	80-120			
Chromium	0.0398	0.0010	mg/L	0.04000	ND	99.5	80-120			
Cobalt	0.0404	0.0010	mg/L	0.04000	ND	101	80-120			
Copper	0.0406	0.0010	mg/L	0.04000	0.0014	98.0	80-120			
Lead	0.0405	0.0010	mg/L	0.04000	ND	101	80-120			
Manganese	0.0411	0.0010	mg/L	0.04000	0.0033	94.4	80-120			
Molybdenum	0.0410	0.0010	mg/L	0.04000	0.0018	97.9	80-120			
Nickel	0.0402	0.0010	mg/L	0.04000	0.0006	99.0	80-120			
Selenium	0.0429	0.0010	mg/L	0.04000	0.0013	104	80-120			
Silver	0.0369	0.0010	mg/L	0.04000	ND	92.2	80-120			B
Thallium	0.0371	0.0010	mg/L	0.04000	0.0004	91.9	80-120			
Vanadium	0.0645	0.0010	mg/L	0.04000	0.0235	102	80-120			
Zinc	0.0489	0.0010	mg/L	0.04000	0.0060	107	80-120			B

Batch B906052 - EPA 1631

Blank (B906052-BLK1)

Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009

Mercury	ND	0.000005	mg/L							U
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Blank (B906052-BLK2)

Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009

Mercury	ND	0.000005	mg/L							U
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Blank (B906052-BLK3)

Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009

Mercury	ND	0.000005	mg/L							U
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Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906052 - EPA 1631

Blank (B906052-BLK4)

Prepared: 17-Jun-2009 Analyzed: 21-Aug-2009

Mercury	ND	0.000005	mg/L							U
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LCS (B906052-BS1)

Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009

Mercury	0.000183	0.000005	mg/L	2.000E-4		91.4	75-125			
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LCS (B906052-BS2)

Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009

Mercury	0.000178	0.000005	mg/L	2.000E-4		88.9	75-125			
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LCS (B906052-BS3)

Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009

Mercury	0.000185	0.000005	mg/L	2.000E-4		92.6	75-125			
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LCS (B906052-BS4)

Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009

Mercury	0.000178	0.000005	mg/L	2.000E-4		89.1	75-125			
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LCS (B906052-BS6)

Prepared: 17-Jun-2009 Analyzed: 02-Jul-2009

Mercury	0.000196	0.000005	mg/L	2.000E-4		98.0	75-125			
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Duplicate (B906052-DUP1)

Source: 9061002-01

Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009

Mercury	0.000371	0.000005	mg/L		0.000372			0.329	25	
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Duplicate (B906052-DUP2)

Source: 9061502-40

Prepared: 17-Jun-2009 Analyzed: 21-Aug-2009

Mercury	ND	0.000005	mg/L		0.000011				25	U
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Duplicate (B906052-DUP3)

Source: 9061503-04

Prepared: 17-Jun-2009 Analyzed: 21-Aug-2009

Mercury	ND	0.000005	mg/L		ND				25	U
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Duplicate (B906052-DUP4)

Source: 9061504-01

Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009

Mercury	0.000366	0.000005	mg/L		0.000391			6.64	25	
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906052 - EPA 1631

Duplicate (B906052-DUP5)		Source: 9061601-03		Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009						
Mercury	0.000707	0.000005	mg/L		0.00083			16.0	25	
Duplicate (B906052-DUP6)		Source: 9061701-01		Prepared: 17-Jun-2009 Analyzed: 17-Jul-2009						
Mercury	ND	0.000005	mg/L		ND				25	U
Duplicate (B906052-DUP7)		Source: 9062302-01		Prepared: 17-Jun-2009 Analyzed: 17-Jul-2009						
Mercury	ND	0.000005	mg/L		0.000037				25	U
Duplicate (B906052-DUP8)		Source: 9061502-17		Prepared: 17-Jun-2009 Analyzed: 17-Jul-2009						
Mercury	0.000024	0.000005	mg/L		0.000012			67.8	25	
Duplicate (B906052-DUP9)		Source: 9061502-41		Prepared: 17-Jun-2009 Analyzed: 17-Jul-2009						
Mercury	ND	0.000005	mg/L		0.000006				25	U
Duplicate (B906052-DUPA)		Source: 9061503-05		Prepared: 17-Jun-2009 Analyzed: 17-Jul-2009						
Mercury	0.000022	0.000005	mg/L		ND				25	
Duplicate (B906052-DUPB)		Source: 9061701-02		Prepared: 17-Jun-2009 Analyzed: 17-Jul-2009						
Mercury	ND	0.000005	mg/L		2.40E-5				25	U
Duplicate (B906052-DUPC)		Source: 9062302-02		Prepared: 17-Jun-2009 Analyzed: 17-Jul-2009						
Mercury	ND	0.000005	mg/L		ND				25	U
Matrix Spike (B906052-MS1)		Source: 9061002-01		Prepared: 17-Jun-2009 Analyzed: 17-Jul-2009						
Mercury	0.000439	0.000005	mg/L	1.000E-4	0.000372	66.1	75-125			
Matrix Spike (B906052-MS2)		Source: 9061502-40		Prepared: 17-Jun-2009 Analyzed: 21-Aug-2009						
Mercury	ND	0.000005	mg/L	2.000E-4	0.000011	NR	75-125			U



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Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906052 - EPA 1631

Matrix Spike (B906052-MS3)		Source: 9061503-04		Prepared: 17-Jun-2009 Analyzed: 21-Aug-2009						
Mercury	ND	0.000005	mg/L	4.000E-4	ND		75-125			U
Matrix Spike (B906052-MS4)		Source: 9061504-01		Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009						
Mercury	0.000549	0.000005	mg/L	2.000E-4	0.000391	78.9	75-125			
Matrix Spike (B906052-MS5)		Source: 9061601-03		Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009						
Mercury	0.000945	0.000005	mg/L	1.000E-4	0.00083	114	75-125			
Matrix Spike (B906052-MS6)		Source: 9061701-01		Prepared: 17-Jun-2009 Analyzed: 21-Aug-2009						
Mercury	ND	0.000005	mg/L	2.000E-4	ND		75-125			U
Matrix Spike (B906052-MS7)		Source: 9062302-01		Prepared: 17-Jun-2009 Analyzed: 21-Aug-2009						
Mercury	ND	0.000005	mg/L	1.000E-4	0.000037	NR	75-125			U
Matrix Spike Dup (B906052-MSD1)		Source: 9061002-01		Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009						
Mercury	0.000437	0.000005	mg/L	1.000E-4	0.000372	65.1	75-125	1.61	25	
Matrix Spike Dup (B906052-MSD2)		Source: 9061502-40		Prepared: 17-Jun-2009 Analyzed: 21-Aug-2009						
Mercury	ND	0.000005	mg/L	2.000E-4	0.000011	NR	75-125		25	U
Matrix Spike Dup (B906052-MSD3)		Source: 9061503-04		Prepared: 17-Jun-2009 Analyzed: 21-Aug-2009						
Mercury	ND	0.000005	mg/L	4.000E-4	ND		75-125		25	U
Matrix Spike Dup (B906052-MSD4)		Source: 9061504-01		Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009						
Mercury	0.00056	0.000005	mg/L	2.000E-4	0.000391	84.3	75-125	6.64	25	
Matrix Spike Dup (B906052-MSD6)		Source: 9061701-01		Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009						
Mercury	0.000338	0.000005	mg/L	2.000E-4	ND	169	75-125		25	

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906052 - EPA 1631

Matrix Spike Dup (B906052-MSD7)

Source: 9062302-01

Prepared: 17-Jun-2009 Analyzed: 01-Jul-2009

Mercury	0.000327	0.000005	mg/L	1.000E-4	0.000037	290	75-125		25	
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Batch B906092 - Default Prep Metals

Blank (B906092-BLK1)

Prepared & Analyzed: 17-Jun-2009

Antimony	0.0019	0.0020	mg/L							J
Arsenic	ND	0.0020	mg/L							U
Barium	0.0028	0.0020	mg/L							
Beryllium	ND	0.0020	mg/L							U
Cadmium	ND	0.0020	mg/L							U
Chromium	0.0004	0.0020	mg/L							J
Cobalt	ND	0.0020	mg/L							U
Copper	0.0029	0.0020	mg/L							
Lead	0.0005	0.0020	mg/L							J
Manganese	0.0013	0.0020	mg/L							J
Molybdenum	ND	0.0020	mg/L							U
Nickel	0.0010	0.0020	mg/L							J
Selenium	ND	0.0020	mg/L							U
Silver	0.0126	0.0020	mg/L							
Thallium	ND	0.0020	mg/L							U
Vanadium	ND	0.0020	mg/L							U
Zinc	0.0165	0.0020	mg/L							

Blank (B906092-BLK2)

Prepared & Analyzed: 17-Jun-2009

Antimony	0.0009	0.0020	mg/L							J
Arsenic	ND	0.0020	mg/L							U
Barium	0.0025	0.0020	mg/L							
Beryllium	ND	0.0020	mg/L							U
Cadmium	ND	0.0020	mg/L							U
Chromium	0.0012	0.0020	mg/L							J
Cobalt	ND	0.0020	mg/L							U
Copper	0.0021	0.0020	mg/L							
Lead	0.0006	0.0020	mg/L							J
Manganese	0.0012	0.0020	mg/L							J
Molybdenum	ND	0.0020	mg/L							U
Nickel	0.0010	0.0020	mg/L							J
Selenium	ND	0.0020	mg/L							U
Silver	0.0038	0.0020	mg/L							
Thallium	ND	0.0020	mg/L							U
Vanadium	ND	0.0020	mg/L							U
Zinc	0.0233	0.0020	mg/L							

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906092 - Default Prep Metals

LCS (B906092-BS1)

Prepared & Analyzed: 17-Jun-2009

Antimony	5.79	0.0020	mg/L	4.800		121	80-120			
Arsenic	2.02	0.0020	mg/L	2.400		84.2	80-120			
Barium	16.1	0.0020	mg/L	12.00		134	80-120			B
Beryllium	1.12	0.0020	mg/L	1.200		92.9	80-120			
Cadmium	1.05	0.0020	mg/L	1.200		87.9	80-120			
Chromium	5.87	0.0020	mg/L	4.800		122	80-120			
Cobalt	6.10	0.0020	mg/L	4.800		127	80-120			
Copper	5.73	0.0020	mg/L	4.800		119	80-120			B
Lead	3.46	0.0020	mg/L	2.400		144	80-120			
Manganese	5.27	0.0020	mg/L	4.800		110	80-120			
Molybdenum	ND	0.0020	mg/L				80-120			U
Nickel	4.65	0.0020	mg/L	4.800		97.0	80-120			
Selenium	1.08	0.0020	mg/L	1.200		89.8	80-120			
Silver	1.44	0.0020	mg/L	1.200		120	80-120			B
Thallium	1.81	0.0020	mg/L	1.200		151	80-120			
Vanadium	5.70	0.0020	mg/L	4.800		119	80-120			
Zinc	11.8	0.0020	mg/L	12.00		98.4	80-120			B

LCS (B906092-BS2)

Prepared & Analyzed: 17-Jun-2009

Antimony	5.78	0.0020	mg/L	4.800		120	80-120			
Arsenic	2.07	0.0020	mg/L	2.400		86.0	80-120			
Barium	16.2	0.0020	mg/L	12.00		135	80-120			B
Beryllium	1.07	0.0020	mg/L	1.200		89.3	80-120			
Cadmium	1.07	0.0020	mg/L	1.200		88.8	80-120			
Chromium	5.87	0.0020	mg/L	4.800		122	80-120			
Cobalt	5.80	0.0020	mg/L	4.800		121	80-120			
Copper	5.60	0.0020	mg/L	4.800		117	80-120			B
Lead	3.51	0.0020	mg/L	2.400		146	80-120			
Manganese	5.19	0.0020	mg/L	4.800		108	80-120			
Molybdenum	ND	0.0020	mg/L				80-120			U
Nickel	5.76	0.0020	mg/L	4.800		120	80-120			
Selenium	1.11	0.0020	mg/L	1.200		92.6	80-120			
Silver	1.47	0.0020	mg/L	1.200		123	80-120			B
Thallium	1.88	0.0020	mg/L	1.200		157	80-120			
Vanadium	5.73	0.0020	mg/L	4.800		119	80-120			
Zinc	11.4	0.0020	mg/L	12.00		95.3	80-120			B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906092 - Default Prep Metals

Duplicate (B906092-DUP1)		Source: 9061502-76			Prepared & Analyzed: 17-Jun-2009					
Antimony	0.0126	0.0020	mg/L		0.0041			102	20	
Arsenic	0.107	0.0020	mg/L		0.106			1.55	20	
Barium	0.512	0.0020	mg/L		0.513			0.257	20	B
Beryllium	0.0044	0.0020	mg/L		0.0042			5.26	20	
Cadmium	0.0008	0.0020	mg/L		0.0010			27.0	20	J
Chromium	0.0339	0.0020	mg/L		0.0338			0.377	20	
Cobalt	0.0183	0.0020	mg/L		0.0188			2.79	20	
Copper	0.0681	0.0020	mg/L		0.0675			0.909	20	B
Lead	0.0381	0.0020	mg/L		0.0380			0.269	20	
Manganese	0.0980	0.0020	mg/L		0.104			6.33	20	
Molybdenum	0.0057	0.0020	mg/L		0.0055			2.14	20	
Nickel	0.0381	0.0020	mg/L		0.0377			1.01	20	
Selenium	0.0050	0.0020	mg/L		0.0044			12.1	20	
Silver	ND	0.0020	mg/L		ND				20	U
Thallium	0.0026	0.0020	mg/L		0.0025			3.55	20	
Vanadium	0.105	0.0020	mg/L		0.110			4.41	20	
Zinc	0.0810	0.0020	mg/L		0.0917			12.5	20	B

Matrix Spike (B906092-MS1)		Source: 9061502-76			Prepared & Analyzed: 17-Jun-2009					
Antimony	5.79	0.0020	mg/L	4.800	0.0041	121	80-120			
Arsenic	2.23	0.0020	mg/L	2.400	0.106	88.7	80-120			
Barium	16.5	0.0020	mg/L	12.00	0.513	133	80-120			B
Beryllium	0.955	0.0020	mg/L	1.200	0.0042	79.2	80-120			
Cadmium	1.03	0.0020	mg/L	1.200	0.0010	86.0	80-120			
Chromium	5.25	0.0020	mg/L	4.800	0.0338	109	80-120			
Cobalt	5.32	0.0020	mg/L	4.800	0.0188	110	80-120			
Copper	5.32	0.0020	mg/L	4.800	0.0675	109	80-120			B
Lead	3.45	0.0020	mg/L	2.400	0.0380	142	80-120			
Manganese	4.78	0.0020	mg/L	4.800	0.104	97.4	80-120			
Molybdenum	0.0057	0.0020	mg/L		0.0055		80-120			
Nickel	5.35	0.0020	mg/L	4.800	0.0377	111	80-120			
Selenium	1.09	0.0020	mg/L	1.200	0.0044	90.5	80-120			
Silver	1.53	0.0020	mg/L	1.200	ND	127	80-120			B
Thallium	1.79	0.0020	mg/L	1.200	0.0025	149	80-120			
Vanadium	5.29	0.0020	mg/L	4.800	0.110	108	80-120			
Zinc	10.9	0.0020	mg/L	12.00	0.0917	90.3	80-120			B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906093 - Default Prep Metals

Blank (B906093-BLK1)

Prepared & Analyzed: 19-Jun-2009

Antimony	0.0005	0.0010	mg/L							J
Arsenic	ND	0.0010	mg/L							U
Barium	ND	0.0010	mg/L							U
Beryllium	ND	0.0010	mg/L							U
Cadmium	ND	0.0010	mg/L							U
Chromium	ND	0.0010	mg/L							U
Cobalt	ND	0.0010	mg/L							U
Copper	ND	0.0010	mg/L							U
Lead	ND	0.0010	mg/L							U
Manganese	ND	0.0010	mg/L							U
Molybdenum	ND	0.0010	mg/L							U
Nickel	ND	0.0010	mg/L							U
Selenium	ND	0.0010	mg/L							U
Silver	0.0038	0.0010	mg/L							
Thallium	ND	0.0010	mg/L							U
Vanadium	ND	0.0010	mg/L							U
Zinc	ND	0.0010	mg/L							U

Blank (B906093-BLK2)

Prepared: 19-Jun-2009 Analyzed: 26-Jun-2009

Antimony	0.0006	0.0010	mg/L							J
Arsenic	ND	0.0010	mg/L							U
Barium	ND	0.0010	mg/L							U
Beryllium	ND	0.0010	mg/L							U
Cadmium	ND	0.0010	mg/L							U
Chromium	ND	0.0010	mg/L							U
Cobalt	ND	0.0010	mg/L							U
Copper	ND	0.0010	mg/L							U
Lead	ND	0.0010	mg/L							U
Manganese	ND	0.0010	mg/L							U
Molybdenum	ND	0.0010	mg/L							U
Nickel	ND	0.0010	mg/L							U
Selenium	ND	0.0010	mg/L							U
Silver	ND	0.0010	mg/L							U
Thallium	ND	0.0010	mg/L							U
Vanadium	ND	0.0010	mg/L							U
Zinc	0.0014	0.0010	mg/L							

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906093 - Default Prep Metals

LCS (B906093-BS1)

Prepared & Analyzed: 19-Jun-2009

Antimony	0.0256	0.0010	mg/L	0.02500		102	80-120			
Arsenic	0.0245	0.0010	mg/L	0.02500		98.0	80-120			
Barium	0.0254	0.0010	mg/L	0.02500		101	80-120			
Beryllium	0.0257	0.0010	mg/L	0.02500		103	80-120			
Cadmium	0.0245	0.0010	mg/L	0.02500		98.0	80-120			
Chromium	0.0251	0.0010	mg/L	0.02500		100	80-120			
Cobalt	0.0264	0.0010	mg/L	0.02500		106	80-120			
Copper	0.0250	0.0010	mg/L	0.02500		100	80-120			
Lead	0.0257	0.0010	mg/L	0.02500		103	80-120			
Manganese	0.0214	0.0010	mg/L	0.02500		85.8	80-120			
Molybdenum	0.0253	0.0010	mg/L	0.02500		101	80-120			
Nickel	0.0250	0.0010	mg/L	0.02500		100	80-120			
Selenium	0.0253	0.0010	mg/L	0.02500		101	80-120			
Silver	0.0262	0.0010	mg/L	0.02500		105	80-120			B
Thallium	0.0272	0.0010	mg/L	0.02500		109	80-120			
Vanadium	0.0256	0.0010	mg/L	0.02500		102	80-120			
Zinc	0.0238	0.0010	mg/L	0.02500		95.1	80-120			B

LCS (B906093-BS2)

Prepared: 19-Jun-2009 Analyzed: 26-Jun-2009

Antimony	0.0251	0.0010	mg/L	0.02500		100	80-120			
Arsenic	0.0241	0.0010	mg/L	0.02500		96.5	80-120			
Barium	0.0249	0.0010	mg/L	0.02500		99.6	80-120			
Beryllium	0.0246	0.0010	mg/L	0.02500		98.5	80-120			
Cadmium	0.0235	0.0010	mg/L	0.02500		94.0	80-120			
Chromium	0.0266	0.0010	mg/L	0.02500		106	80-120			
Cobalt	0.0259	0.0010	mg/L	0.02500		104	80-120			
Copper	0.0250	0.0010	mg/L	0.02500		100	80-120			
Lead	0.0259	0.0010	mg/L	0.02500		104	80-120			
Manganese	0.0212	0.0010	mg/L	0.02500		84.8	80-120			
Molybdenum	0.0251	0.0010	mg/L	0.02500		100	80-120			
Nickel	0.0260	0.0010	mg/L	0.02500		104	80-120			
Selenium	0.0221	0.0010	mg/L	0.02500		88.4	80-120			
Silver	0.0248	0.0010	mg/L	0.02500		99.4	80-120			B
Thallium	0.0258	0.0010	mg/L	0.02500		103	80-120			
Vanadium	0.0260	0.0010	mg/L	0.02500		104	80-120			
Zinc	0.0231	0.0010	mg/L	0.02500		92.3	80-120			B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906093 - Default Prep Metals

Duplicate (B906093-DUP1)

Source: 9061701-01

Prepared & Analyzed: 19-Jun-2009

Antimony	0.0016	0.0010	mg/L		0.0017			3.86	20	
Arsenic	0.0507	0.0010	mg/L		0.0508			0.147	20	
Barium	0.113	0.0010	mg/L		0.109			3.09	20	
Beryllium	ND	0.0010	mg/L		ND				20	U
Cadmium	ND	0.0010	mg/L		ND				20	U
Chromium	0.0013	0.0010	mg/L		0.0012			4.28	20	
Cobalt	ND	0.0010	mg/L		ND				20	U
Copper	0.0024	0.0010	mg/L		0.0025			3.77	20	
Lead	ND	0.0010	mg/L		ND				20	U
Manganese	0.0012	0.0010	mg/L		0.0012			2.11	20	
Molybdenum	0.0021	0.0010	mg/L		0.0022			2.44	20	
Nickel	0.0006	0.0010	mg/L		0.0008			26.6	20	J
Selenium	0.0033	0.0010	mg/L		0.0034			2.42	20	
Silver	0.0006	0.0010	mg/L		0.0008			29.4	20	J, B
Thallium	0.0006	0.0010	mg/L		0.0005			2.43	20	J
Vanadium	0.0296	0.0010	mg/L		0.0298			0.602	20	
Zinc	0.0056	0.0010	mg/L		0.0058			2.62	20	B

Duplicate (B906093-DUP2)

Source: 9062302-01

Prepared: 19-Jun-2009 Analyzed: 26-Jun-2009

Antimony	0.0020	0.0010	mg/L		0.0022			6.10	20	
Arsenic	0.0640	0.0010	mg/L		0.0633			1.09	20	
Barium	0.125	0.0010	mg/L		0.123			1.75	20	
Beryllium	ND	0.0010	mg/L		ND				20	U
Cadmium	ND	0.0010	mg/L		ND				20	U
Chromium	0.0017	0.0010	mg/L		0.0018			5.97	20	
Cobalt	ND	0.0010	mg/L		ND				20	U
Copper	0.0009	0.0010	mg/L		0.0011			14.8	20	J
Lead	ND	0.0010	mg/L		ND				20	U
Manganese	0.00042	0.0010	mg/L		0.0005			20.0	20	J
Molybdenum	0.0027	0.0010	mg/L		0.0027			0.877	20	
Nickel	0.0004	0.0010	mg/L		0.0004			5.39	20	J
Selenium	0.0065	0.0010	mg/L		0.0064			1.73	20	
Silver	ND	0.0010	mg/L		ND				20	U
Thallium	0.0006	0.0010	mg/L		0.0006			0.244	20	J
Vanadium	0.0384	0.0010	mg/L		0.0387			0.865	20	
Zinc	0.0032	0.0010	mg/L		0.0041			22.1	20	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906093 - Default Prep Metals

Matrix Spike (B906093-MS1)		Source: 9061701-01			Prepared & Analyzed: 19-Jun-2009					
Antimony	0.0427	0.0010	mg/L	0.04000	0.0017	103	80-120			
Arsenic	0.0887	0.0010	mg/L	0.04000	0.0508	94.9	80-120			
Barium	0.149	0.0010	mg/L	0.04000	0.109	99.6	80-120			
Beryllium	0.0427	0.0010	mg/L	0.04000	ND	107	80-120			
Cadmium	0.0423	0.0010	mg/L	0.04000	ND	106	80-120			
Chromium	0.0425	0.0010	mg/L	0.04000	0.0012	103	80-120			
Cobalt	0.0411	0.0010	mg/L	0.04000	ND	103	80-120			
Copper	0.0416	0.0010	mg/L	0.04000	0.0025	97.9	80-120			
Lead	0.0403	0.0010	mg/L	0.04000	ND	101	80-120			
Manganese	0.0335	0.0010	mg/L	0.04000	0.0012	80.8	80-120			
Molybdenum	0.0417	0.0010	mg/L	0.04000	0.0022	98.8	80-120			
Nickel	0.0402	0.0010	mg/L	0.04000	0.0008	98.6	80-120			
Selenium	0.0460	0.0010	mg/L	0.04000	0.0034	107	80-120			
Silver	0.0391	0.0010	mg/L	0.04000	0.0008	95.8	80-120			B
Thallium	0.0436	0.0010	mg/L	0.04000	0.0005	108	80-120			
Vanadium	0.0677	0.0010	mg/L	0.04000	0.0298	94.9	80-120			
Zinc	0.0484	0.0010	mg/L	0.04000	0.0058	107	80-120			B

Matrix Spike (B906093-MS2)		Source: 9062302-01			Prepared: 19-Jun-2009 Analyzed: 26-Jun-2009					
Antimony	0.0417	0.0010	mg/L	0.04000	0.0022	98.7	80-120			
Arsenic	0.105	0.0010	mg/L	0.04000	0.0633	105	80-120			
Barium	0.158	0.0010	mg/L	0.04000	0.123	87.8	80-120			
Beryllium	0.0420	0.0010	mg/L	0.04000	ND	105	80-120			
Cadmium	0.0394	0.0010	mg/L	0.04000	ND	98.4	80-120			
Chromium	0.0466	0.0010	mg/L	0.04000	0.0018	112	80-120			
Cobalt	0.0407	0.0010	mg/L	0.04000	ND	102	80-120			
Copper	0.0416	0.0010	mg/L	0.04000	0.0011	101	80-120			
Lead	0.0400	0.0010	mg/L	0.04000	ND	100	80-120			
Manganese	0.0342	0.0010	mg/L	0.04000	0.0005	84.2	80-120			
Molybdenum	0.0434	0.0010	mg/L	0.04000	0.0027	102	80-120			
Nickel	0.0435	0.0010	mg/L	0.04000	0.0004	108	80-120			
Selenium	0.0488	0.0010	mg/L	0.04000	0.0064	106	80-120			
Silver	0.0406	0.0010	mg/L	0.04000	ND	101	80-120			B
Thallium	0.0407	0.0010	mg/L	0.04000	0.0006	100	80-120			
Vanadium	0.0776	0.0010	mg/L	0.04000	0.0387	97.3	80-120			
Zinc	0.0452	0.0010	mg/L	0.04000	0.0041	103	80-120			B

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USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906094 - Default Prep Metals

Blank (B906094-BLK1)

Prepared & Analyzed: 19-Jun-2009

Antimony	0.0047	0.0020	mg/L							
Arsenic	ND	0.0020	mg/L							U
Barium	0.00063	0.0020	mg/L							J
Beryllium	ND	0.0020	mg/L							U
Cadmium	ND	0.0020	mg/L							U
Chromium	0.0007	0.0020	mg/L							J
Cobalt	ND	0.0020	mg/L							U
Copper	0.0005	0.0020	mg/L							J
Lead	0.0005	0.0020	mg/L							J
Manganese	ND	0.0020	mg/L							U
Molybdenum	ND	0.0020	mg/L							U
Nickel	ND	0.0020	mg/L							U
Selenium	ND	0.0020	mg/L							U
Silver	ND	0.0020	mg/L							U
Thallium	ND	0.0020	mg/L							U
Vanadium	ND	0.0020	mg/L							U
Zinc	0.0061	0.0020	mg/L							

Blank (B906094-BLK2)

Prepared & Analyzed: 26-Jun-2009

Antimony	0.0007	0.0020	mg/L							J
Arsenic	ND	0.0020	mg/L							U
Barium	ND	0.0020	mg/L							U
Beryllium	ND	0.0020	mg/L							U
Cadmium	ND	0.0020	mg/L							U
Chromium	ND	0.0020	mg/L							U
Cobalt	ND	0.0020	mg/L							U
Copper	ND	0.0020	mg/L							U
Lead	ND	0.0020	mg/L							U
Manganese	ND	0.0020	mg/L							U
Molybdenum	ND	0.0020	mg/L							U
Nickel	ND	0.0020	mg/L							U
Selenium	ND	0.0020	mg/L							U
Silver	ND	0.0020	mg/L							U
Thallium	ND	0.0020	mg/L							U
Vanadium	ND	0.0020	mg/L							U
Zinc	0.0301	0.0020	mg/L							

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906094 - Default Prep Metals

LCS (B906094-BS1)

Prepared & Analyzed: 19-Jun-2009

Antimony	1.22	0.0020	mg/L	1.200		102	80-120			B
Arsenic	0.606	0.0020	mg/L	0.6000		101	80-120			
Barium	3.03	0.0020	mg/L	3.000		101	80-120			
Beryllium	0.321	0.0020	mg/L	0.3000		107	80-120			
Cadmium	0.308	0.0020	mg/L	0.3000		103	80-120			
Chromium	1.28	0.0020	mg/L	1.200		106	80-120			
Cobalt	1.26	0.0020	mg/L	1.200		105	80-120			
Copper	1.23	0.0020	mg/L	1.200		103	80-120			
Lead	0.613	0.0020	mg/L	0.6000		102	80-120			
Manganese	1.22	0.0020	mg/L	1.200		101	80-120			
Molybdenum	ND	0.0020	mg/L				80-120			U
Nickel	1.25	0.0020	mg/L	1.200		104	80-120			
Selenium	0.302	0.0020	mg/L	0.3000		101	80-120			
Silver	0.309	0.0020	mg/L	0.3000		103	80-120			
Thallium	0.329	0.0020	mg/L	0.3000		110	80-120			
Vanadium	1.36	0.0020	mg/L	1.200		113	80-120			
Zinc	3.09	0.0020	mg/L	3.000		103	80-120			B

LCS (B906094-BS2)

Prepared & Analyzed: 26-Jun-2009

Antimony	4.99	0.0020	mg/L	4.800		104	80-120			B
Arsenic	2.44	0.0020	mg/L	2.400		102	80-120			
Barium	12.2	0.0020	mg/L	12.00		102	80-120			
Beryllium	1.19	0.0020	mg/L	1.200		99.5	80-120			
Cadmium	1.19	0.0020	mg/L	1.200		99.2	80-120			
Chromium	4.74	0.0020	mg/L	4.800		98.7	80-120			
Cobalt	4.82	0.0020	mg/L	4.800		100	80-120			
Copper	4.73	0.0020	mg/L	4.800		98.4	80-120			
Lead	2.55	0.0020	mg/L	2.400		106	80-120			
Manganese	4.95	0.0020	mg/L	4.800		103	80-120			
Molybdenum	0.0006	0.0020	mg/L				80-120			J
Nickel	4.76	0.0020	mg/L	4.800		99.2	80-120			
Selenium	1.16	0.0020	mg/L	1.200		96.9	80-120			
Silver	1.27	0.0020	mg/L	1.200		106	80-120			
Thallium	1.31	0.0020	mg/L	1.200		109	80-120			
Vanadium	5.66	0.0020	mg/L	4.800		118	80-120			
Zinc	11.0	0.0020	mg/L	12.00		91.6	80-120			B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906094 - Default Prep Metals

Duplicate (B906094-DUP1)		Source: 9061701-13			Prepared & Analyzed: 19-Jun-2009					
Antimony	0.0063	0.0020	mg/L		0.0149			81.5	20	B
Arsenic	0.190	0.0020	mg/L		0.182			4.46	20	
Barium	1.03	0.0020	mg/L		1.02			0.362	20	
Beryllium	0.0081	0.0020	mg/L		0.0087			6.66	20	
Cadmium	0.0014	0.0020	mg/L		0.0013			1.35	20	J
Chromium	0.0525	0.0020	mg/L		0.0524			0.133	20	
Cobalt	0.0351	0.0020	mg/L		0.0358			1.83	20	
Copper	0.117	0.0020	mg/L		0.120			1.90	20	
Lead	0.0998	0.0020	mg/L		0.0975			2.28	20	
Manganese	0.127	0.0020	mg/L		0.124			2.19	20	
Molybdenum	0.0096	0.0020	mg/L		0.0095			1.02	20	
Nickel	0.0678	0.0020	mg/L		0.0701			3.37	20	
Selenium	0.0101	0.0020	mg/L		0.0098			3.66	20	
Silver	0.0008	0.0020	mg/L		0.0010			18.3	20	J
Thallium	0.0050	0.0020	mg/L		0.0050			0.210	20	
Vanadium	0.189	0.0020	mg/L		0.184			2.36	20	
Zinc	0.152	0.0020	mg/L		0.146			3.81	20	B

Duplicate (B906094-DUP2)		Source: 9062302-13			Prepared & Analyzed: 26-Jun-2009					
Antimony	0.0057	0.0020	mg/L		0.0069			18.7	20	B
Arsenic	0.128	0.0020	mg/L		0.132			3.43	20	
Barium	0.548	0.0020	mg/L		0.556			1.38	20	
Beryllium	0.0033	0.0020	mg/L		0.0033			2.50	20	
Cadmium	0.0006	0.0020	mg/L		0.0005			9.29	20	J
Chromium	0.0258	0.0020	mg/L		0.0245			4.89	20	
Cobalt	0.0142	0.0020	mg/L		0.0142			0.318	20	
Copper	0.0520	0.0020	mg/L		0.0516			0.759	20	
Lead	0.0393	0.0020	mg/L		0.0399			1.54	20	
Manganese	0.0794	0.0020	mg/L		0.0774			2.54	20	
Molybdenum	0.0066	0.0020	mg/L		0.0067			1.89	20	
Nickel	0.0274	0.0020	mg/L		0.0262			4.70	20	
Selenium	0.0070	0.0020	mg/L		0.0072			1.82	20	
Silver	ND	0.0020	mg/L		0.0004				20	U
Thallium	0.0027	0.0020	mg/L		0.0028			4.18	20	
Vanadium	0.104	0.0020	mg/L		0.106			1.89	20	
Zinc	0.0681	0.0020	mg/L		0.0678			0.340	20	B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906094 - Default Prep Metals

Matrix Spike (B906094-MS1)

Source: 9061701-13

Prepared & Analyzed: 19-Jun-2009

Antimony	4.05	0.0020	mg/L	4.800	0.0149	84.0	80-120			B
Arsenic	2.71	0.0020	mg/L	2.400	0.182	105	80-120			
Barium	13.3	0.0020	mg/L	12.00	1.02	102	80-120			
Beryllium	1.27	0.0020	mg/L	1.200	0.0087	105	80-120			
Cadmium	1.25	0.0020	mg/L	1.200	0.0013	104	80-120			
Chromium	5.02	0.0020	mg/L	4.800	0.0524	104	80-120			
Cobalt	5.02	0.0020	mg/L	4.800	0.0358	104	80-120			
Copper	4.98	0.0020	mg/L	4.800	0.120	101	80-120			
Lead	2.67	0.0020	mg/L	2.400	0.0975	107	80-120			
Manganese	4.99	0.0020	mg/L	4.800	0.124	101	80-120			
Molybdenum	0.0087	0.0020	mg/L		0.0095		80-120			
Nickel	5.05	0.0020	mg/L	4.800	0.0701	104	80-120			
Selenium	1.21	0.0020	mg/L	1.200	0.0098	100	80-120			
Silver	0.329	0.0020	mg/L	1.200	0.0010	27.3	80-120			
Thallium	1.32	0.0020	mg/L	1.200	0.0050	110	80-120			
Vanadium	6.55	0.0020	mg/L	4.800	0.184	133	80-120			
Zinc	12.2	0.0020	mg/L	12.00	0.146	101	80-120			B

Batch B906096 - EPA 3050B

Blank (B906096-BLK1)

Prepared: 25-Jun-2009 Analyzed: 26-Jun-2009

Antimony	0.254	0.0500	mg/kg							
Arsenic	ND	0.0500	mg/kg							U
Barium	0.126	0.0500	mg/kg							
Beryllium	ND	0.0500	mg/kg							U
Cadmium	ND	0.0500	mg/kg							U
Chromium	0.200	0.0500	mg/kg							
Cobalt	ND	0.0500	mg/kg							U
Copper	ND	0.0500	mg/kg							U
Lead	0.0333	0.0500	mg/kg							J
Manganese	0.0727	0.0500	mg/kg							
Molybdenum	0.0306	0.0500	mg/kg							J
Nickel	0.0456	0.0500	mg/kg							J
Selenium	ND	0.0500	mg/kg							U
Silver	ND	0.0500	mg/kg							U
Thallium	ND	0.0500	mg/kg							U
Vanadium	0.0117	0.0500	mg/kg							J
Zinc	1.96	0.0500	mg/kg							

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906096 - EPA 3050B

LCS (B906096-BS1)

Prepared: 25-Jun-2009 Analyzed: 26-Jun-2009

Antimony	94.7	0.0500	mg/kg	100.0		94.7	80-120			B
Arsenic	49.2	0.0500	mg/kg	50.00		98.3	80-120			
Barium	246	0.0500	mg/kg	250.0		98.4	80-120			B
Beryllium	25.1	0.0500	mg/kg	25.00		100	80-120			
Cadmium	23.3	0.0500	mg/kg	25.00		93.0	80-120			
Chromium	107	0.0500	mg/kg	100.0		107	80-120			B
Cobalt	109	0.0500	mg/kg	100.0		109	80-120			
Copper	103	0.0500	mg/kg	100.0		103	80-120			
Lead	51.4	0.0500	mg/kg	50.00		103	80-120			
Manganese	89.6	0.0500	mg/kg	100.0		89.6	80-120			B
Molybdenum	0.0245	0.0500	mg/kg				80-120			J
Nickel	106	0.0500	mg/kg	100.0		106	80-120			
Selenium	21.6	0.0500	mg/kg	25.00		86.3	80-120			
Silver	25.9	0.0500	mg/kg	25.00		104	80-120			
Thallium	26.5	0.0500	mg/kg	25.00		106	80-120			
Vanadium	105	0.0500	mg/kg	100.0		105	80-120			
Zinc	232	0.0500	mg/kg	250.0		92.9	80-120			B

Duplicate (B906096-DUP1)

Source: 9061502-01

Prepared: 25-Jun-2009 Analyzed: 26-Jun-2009

Antimony	0.186	0.0500	mg/kg		0.233		22.5	20		B
Arsenic	66.0	0.0500	mg/kg		65.8		0.228	20		
Barium	652	0.0500	mg/kg		655		0.462	20		B
Beryllium	7.36	0.0500	mg/kg		7.15		2.87	20		
Cadmium	0.579	0.0500	mg/kg		0.576		0.545	20		
Chromium	49.4	0.0500	mg/kg		48.7		1.28	20		B
Cobalt	25.7	0.0500	mg/kg		25.6		0.159	20		
Copper	83.6	0.0500	mg/kg		84.1		0.688	20		
Lead	37.2	0.0500	mg/kg		36.4		2.19	20		
Manganese	153	0.0500	mg/kg		153		0.261	20		B
Molybdenum	3.94	0.0500	mg/kg		4.04		2.51	20		
Nickel	53.3	0.0500	mg/kg		52.6		1.39	20		
Selenium	7.23	0.0500	mg/kg		6.97		3.65	20		
Silver	0.353	0.0500	mg/kg		0.426		18.8	20		
Thallium	2.23	0.0500	mg/kg		2.19		1.76	20		
Vanadium	135	0.0500	mg/kg		133		1.88	20		
Zinc	75.1	0.0500	mg/kg		77.4		3.05	20		B

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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906096 - EPA 3050B

Matrix Spike (B906096-MS1)

Source: 9061502-01

Prepared: 25-Jun-2009 Analyzed: 26-Jun-2009

Antimony	5.79	0.0500	mg/kg	100.1	0.233	5.55	80-120			B
Arsenic	101	0.0500	mg/kg	50.05	65.8	71.0	80-120			
Barium	879	0.0500	mg/kg	250.3	655	89.7	80-120			B
Beryllium	34.3	0.0500	mg/kg	25.03	7.15	108	80-120			
Cadmium	23.2	0.0500	mg/kg	25.03	0.576	90.2	80-120			
Chromium	156	0.0500	mg/kg	100.1	48.7	107	80-120			B
Cobalt	130	0.0500	mg/kg	100.1	25.6	104	80-120			
Copper	180	0.0500	mg/kg	100.1	84.1	95.6	80-120			
Lead	83.2	0.0500	mg/kg	50.05	36.4	93.4	80-120			
Manganese	276	0.0500	mg/kg	100.1	153	123	80-120			B
Molybdenum	4.00	0.0500	mg/kg		4.04		80-120			
Nickel	155	0.0500	mg/kg	100.1	52.6	103	80-120			
Selenium	28.8	0.0500	mg/kg	25.03	6.97	87.3	80-120			
Silver	24.7	0.0500	mg/kg	25.03	0.426	97.1	80-120			
Thallium	26.7	0.0500	mg/kg	25.03	2.19	98.1	80-120			
Vanadium	321	0.0500	mg/kg	100.1	133	187	80-120			
Zinc	303	0.0500	mg/kg	250.3	77.4	90.3	80-120			B

Batch B907001 - Default Prep Metals

Blank (B907001-BLK1)

Prepared & Analyzed: 25-Jun-2009

Aluminum	ND	0.200	mg/L							U
Calcium	ND	0.200	mg/L							U
Iron	ND	0.200	mg/L							U
Magnesium	ND	0.200	mg/L							U
Potassium	0.0690	0.200	mg/L							J
Sodium	ND	0.200	mg/L							U



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907001 - Default Prep Metals

Blank (B907001-BLK2)

Prepared & Analyzed: 25-Jun-2009

Aluminum	0.0500	0.200	mg/L							J
Calcium	0.0505	0.200	mg/L							J
Iron	ND	0.200	mg/L							U
Magnesium	ND	0.200	mg/L							U
Potassium	ND	0.200	mg/L							U
Sodium	ND	0.200	mg/L							U

LCS (B907001-BS1)

Prepared & Analyzed: 25-Jun-2009

Aluminum	ND	0.200	mg/L				80-120			U
Calcium	ND	0.200	mg/L				80-120			U
Iron	24.9	0.200	mg/L	30.00		82.8	80-120			
Magnesium	ND	0.200	mg/L				80-120			U
Potassium	ND	0.200	mg/L				80-120			U
Sodium	ND	0.200	mg/L				80-120			U

LCS (B907001-BS2)

Prepared & Analyzed: 25-Jun-2009

Aluminum	ND	0.200	mg/L				80-120			U
Calcium	ND	0.200	mg/L				80-120			U
Iron	25.0	0.200	mg/L	30.00		83.3	80-120			
Magnesium	ND	0.200	mg/L				80-120			U
Potassium	0.0748	0.200	mg/L				80-120			J
Sodium	ND	0.200	mg/L				80-120			U

Duplicate (B907001-DUP1)

Source: 9061701-01

Prepared & Analyzed: 25-Jun-2009

Aluminum	0.119	0.200	mg/L		0.0542		74.5	20		J
Calcium	14.5	0.200	mg/L		13.1		10.1	20		
Iron	ND	0.200	mg/L		ND			20		U
Magnesium	2.68	0.200	mg/L		2.45		8.94	20		
Potassium	1.49	0.200	mg/L		1.41		5.58	20		
Sodium	2.65	0.200	mg/L		2.58		2.69	20		



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ERDC - ECB

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907001 - Default Prep Metals

Duplicate (B907001-DUP2)

Source: 9062302-01

Prepared & Analyzed: 25-Jun-2009

Aluminum	0.119	0.200	mg/L		0.123			3.41	20	J
Calcium	14.5	0.200	mg/L		14.5			0.0179	20	
Iron	ND	0.200	mg/L		ND				20	U
Magnesium	2.68	0.200	mg/L		2.63			1.79	20	
Potassium	1.49	0.200	mg/L		1.51			0.796	20	
Sodium	2.65	0.200	mg/L		2.69			1.64	20	

Matrix Spike (B907001-MS1)

Source: 9061701-01

Prepared & Analyzed: 25-Jun-2009

Aluminum	1.85	0.200	mg/L	2.000	0.0542	89.9	80-120			
Calcium	15.9	0.200	mg/L	2.000	13.1	140	80-120			
Iron	1.70	0.200	mg/L	2.000	ND	85.1	80-120			
Magnesium	4.35	0.200	mg/L	2.000	2.45	95.2	80-120			
Potassium	3.29	0.200	mg/L	2.000	1.41	93.7	80-120			
Sodium	4.30	0.200	mg/L	2.000	2.58	86.0	80-120			

Matrix Spike (B907001-MS2)

Source: 9062302-01

Prepared & Analyzed: 25-Jun-2009

Aluminum	1.85	0.200	mg/L	2.000	0.123	86.5	80-120			
Calcium	15.9	0.200	mg/L	2.000	14.5	71.1	80-120			
Iron	1.70	0.200	mg/L	2.000	ND	85.1	80-120			
Magnesium	4.35	0.200	mg/L	2.000	2.63	86.1	80-120			
Potassium	3.29	0.200	mg/L	2.000	1.51	89.1	80-120			
Sodium	4.30	0.200	mg/L	2.000	2.69	80.3	80-120			

Batch B907002 - Default Prep Metals

Blank (B907002-BLK1)

Prepared & Analyzed: 25-Jun-2009

Aluminum	0.0931	0.200	mg/L							J
Calcium	0.723	0.200	mg/L							
Iron	ND	0.200	mg/L							U
Magnesium	0.170	0.200	mg/L							J
Potassium	0.283	0.200	mg/L							
Sodium	0.481	0.200	mg/L							

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Project Manager: Tony Bednar

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DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907002 - Default Prep Metals

Blank (B907002-BLK2)

Prepared & Analyzed: 25-Jun-2009

Aluminum	0.116	0.200	mg/L							J
Calcium	0.753	0.200	mg/L							
Iron	ND	0.200	mg/L							U
Magnesium	0.184	0.200	mg/L							J
Potassium	0.195	0.200	mg/L							J
Sodium	0.436	0.200	mg/L							

Blank (B907002-BLK3)

Prepared & Analyzed: 25-Jun-2009

Aluminum	ND	0.200	mg/L							U
Calcium	ND	0.200	mg/L							U
Iron	ND	0.200	mg/L							U
Magnesium	ND	0.200	mg/L							U
Potassium	ND	0.200	mg/L							U
Sodium	ND	0.200	mg/L							U

Blank (B907002-BLK4)

Prepared & Analyzed: 25-Jun-2009

Aluminum	ND	0.0200	mg/L							U
Calcium	ND	0.200	mg/L							U
Iron	ND	0.0200	mg/L							U
Magnesium	ND	0.100	mg/L							U
Potassium	ND	0.200	mg/L							U
Sodium	ND	0.200	mg/L							U

LCS (B907002-BS1)

Prepared & Analyzed: 25-Jun-2009

Aluminum	0.247	0.200	mg/L				80-120			
Calcium	1.02	0.200	mg/L				80-120			B
Iron	25.0	0.200	mg/L	25.00		100	80-120			
Magnesium	0.235	0.200	mg/L				80-120			
Potassium	0.392	0.200	mg/L				80-120			B
Sodium	0.721	0.200	mg/L				80-120			B



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DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907002 - Default Prep Metals

LCS (B907002-BS2)

Prepared & Analyzed: 25-Jun-2009

Aluminum	0.204	0.200	mg/L				80-120			
Calcium	0.824	0.200	mg/L				80-120			B
Iron	25.0	0.200	mg/L	25.00		100	80-120			
Magnesium	0.190	0.200	mg/L				80-120			J
Potassium	0.455	0.200	mg/L				80-120			B
Sodium	0.548	0.200	mg/L				80-120			B

LCS (B907002-BS3)

Prepared & Analyzed: 25-Jun-2009

Aluminum	0.944	0.200	mg/L				80-120			
Calcium	0.982	0.200	mg/L				80-120			B
Iron	1.01	0.200	mg/L	1.000		101	80-120			
Magnesium	0.976	0.200	mg/L				80-120			
Potassium	0.952	0.200	mg/L				80-120			B
Sodium	0.945	0.200	mg/L				80-120			B

LCS (B907002-BS4)

Prepared & Analyzed: 25-Jun-2009

Aluminum	ND	0.200	mg/L				80-120			U
Calcium	ND	0.200	mg/L				80-120			U
Iron	ND	0.200	mg/L				80-120			U
Magnesium	ND	0.200	mg/L				80-120			U
Potassium	ND	0.200	mg/L				80-120			U
Sodium	ND	0.200	mg/L				80-120			U

Duplicate (B907002-DUP1)

Source: 9061701-13

Prepared & Analyzed: 25-Jun-2009

Aluminum	54.4	0.200	mg/L		55.8		2.64	20		
Calcium	24.4	0.200	mg/L		24.6		0.645	20		B
Iron	21.3	0.200	mg/L		21.9		2.61	20		
Magnesium	7.16	0.200	mg/L		7.33		2.34	20		
Potassium	11.2	0.200	mg/L		11.4		2.32	20		B
Sodium	4.49	0.200	mg/L		4.58		2.17	20		B

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ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907002 - Default Prep Metals

Duplicate (B907002-DUP2)		Source: 9062302-13		Prepared & Analyzed: 25-Jun-2009						
Aluminum	21.9	0.200	mg/L		22.1		0.685	20		
Calcium	18.9	0.200	mg/L		19.2		1.91	20		B
Iron	8.89	0.200	mg/L		8.97		0.944	20		
Magnesium	4.43	0.200	mg/L		4.51		1.63	20		
Potassium	4.92	0.200	mg/L		4.98		1.29	20		B
Sodium	3.05	0.200	mg/L		3.11		1.95	20		B

Duplicate (B907002-DUP3)		Prepared & Analyzed: 25-Jun-2009								
Aluminum	ND	0.0200	mg/L					20		U
Calcium	ND	0.200	mg/L					20		U
Iron	ND	0.0200	mg/L					20		U
Magnesium	ND	0.100	mg/L					20		U
Potassium	ND	0.200	mg/L					20		U
Sodium	ND	0.200	mg/L					20		U

Duplicate (B907002-DUP4)		Prepared & Analyzed: 25-Jun-2009								
Aluminum	ND	0.0200	mg/L					20		U
Calcium	ND	0.200	mg/L					20		U
Iron	ND	0.0200	mg/L					20		U
Magnesium	ND	0.100	mg/L					20		U
Potassium	ND	0.200	mg/L					20		U
Sodium	ND	0.200	mg/L					20		U

Matrix Spike (B907002-MS1)		Source: 9061701-13		Prepared & Analyzed: 25-Jun-2009						
Aluminum	60.1	0.200	mg/L		55.8		80-120			
Calcium	24.3	0.200	mg/L		24.6		80-120			B
Iron	47.5	0.200	mg/L	25.00	21.9	102	80-120			
Magnesium	7.42	0.200	mg/L		7.33		80-120			
Potassium	12.5	0.200	mg/L		11.4		80-120			B
Sodium	4.60	0.200	mg/L		4.58		80-120			B

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ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907002 - Default Prep Metals

Matrix Spike (B907002-MS2)		Source: 9062302-13		Prepared & Analyzed: 25-Jun-2009						
Aluminum	21.7	0.200	mg/L		22.1		80-120			
Calcium	18.9	0.200	mg/L		19.2		80-120			B
Iron	8.83	0.200	mg/L	25.00	8.97	NR	80-120			
Magnesium	4.36	0.200	mg/L		4.51		80-120			
Potassium	4.90	0.200	mg/L		4.98		80-120			B
Sodium	3.02	0.200	mg/L		3.11		80-120			B

Matrix Spike (B907002-MS3)		Prepared & Analyzed: 25-Jun-2009								
Aluminum	ND	0.0200	mg/L				80-120			U
Calcium	ND	0.200	mg/L				80-120			U
Iron	ND	0.0200	mg/L				80-120			U
Magnesium	ND	0.100	mg/L				80-120			U
Potassium	ND	0.200	mg/L				80-120			U
Sodium	ND	0.200	mg/L				80-120			U

Matrix Spike (B907002-MS4)		Prepared & Analyzed: 25-Jun-2009								
Aluminum	ND	0.0200	mg/L				80-120			U
Calcium	ND	0.200	mg/L				80-120			U
Iron	ND	0.0200	mg/L				80-120			U
Magnesium	ND	0.100	mg/L				80-120			U
Potassium	ND	0.200	mg/L				80-120			U
Sodium	ND	0.200	mg/L				80-120			U

Batch B907003 - EPA 3050B

Blank (B907003-BLK1)		Prepared & Analyzed: 25-Jun-2009								
Aluminum	9.31	2.00	mg/kg							
Calcium	12.8	2.00	mg/kg							
Iron	1.79	2.00	mg/kg							J
Magnesium	2.69	2.00	mg/kg							
Potassium	16.5	2.00	mg/kg							
Sodium	23.0	2.00	mg/kg							



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DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907003 - EPA 3050B

LCS (B907003-BS1)

Prepared & Analyzed: 25-Jun-2009

Aluminum	11.3	2.00	mg/kg				80-120			B
Calcium	12.5	2.00	mg/kg				80-120			B
Iron	507	2.00	mg/kg	500.0		101	80-120			
Magnesium	2.33	2.00	mg/kg				80-120			B
Potassium	21.8	2.00	mg/kg				80-120			B
Sodium	23.1	2.00	mg/kg				80-120			B

Duplicate (B907003-DUP1)

Source: 9061502-01

Prepared & Analyzed: 25-Jun-2009

Aluminum	31000	2.00	mg/kg		4890			145	20	B
Calcium	9140	2.00	mg/kg		2410			117	20	B
Iron	18000	2.00	mg/kg		10400			52.9	20	
Magnesium	2810	2.00	mg/kg		559			134	20	B
Potassium	4740	2.00	mg/kg		625			153	20	B
Sodium	715	2.00	mg/kg		65.2			167	20	B

Matrix Spike (B907003-MS1)

Source: 9061502-01

Prepared & Analyzed: 25-Jun-2009

Aluminum	32000	2.00	mg/kg		4890		80-120			B
Calcium	9320	2.00	mg/kg		2410		80-120			B
Iron	18400	2.00	mg/kg	1001	10400	797	80-120			
Magnesium	2880	2.00	mg/kg		559		80-120			B
Potassium	4960	2.00	mg/kg		625		80-120			B
Sodium	747	2.00	mg/kg		65.2		80-120			B

Batch B907024 - Default Prep Metals

Blank (B907024-BLK1)

Prepared & Analyzed: 25-Jun-2009

Strontium	ND	0.0200	mg/L							U
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DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907024 - Default Prep Metals

Blank (B907024-BLK2)

Prepared & Analyzed: 25-Jun-2009

Strontium	ND	0.0200	mg/L							U
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Blank (B907024-BLK3)

Prepared & Analyzed: 25-Jun-2009

Strontium	ND	0.0200	mg/L							U
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Blank (B907024-BLK4)

Prepared: 25-Jun-2009 Analyzed: 16-Jul-2009

Strontium	ND	0.0200	mg/L							U
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Blank (B907024-BLK5)

Prepared: 25-Jun-2009 Analyzed: 16-Jul-2009

Strontium	ND	0.0200	mg/L							U
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Blank (B907024-BLK6)

Prepared: 25-Jun-2009 Analyzed: 16-Jul-2009

Strontium	ND	0.0200	mg/L							U
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Blank (B907024-BLK7)

Prepared: 25-Jun-2009 Analyzed: 16-Jul-2009

Strontium	ND	0.0200	mg/L							U
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Duplicate (B907024-DUP1)

Source: 9061502-40

Prepared & Analyzed: 25-Jun-2009

Strontium	0.197	0.0200	mg/L		0.135			37.4	20	
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Batch B907025 - EPA 3050B

Blank (B907025-BLK1)

Prepared & Analyzed: 25-Jun-2009

Strontium	ND	4.00	mg/kg							U
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Duplicate (B907025-DUP1)

Source: 9061502-01

Prepared & Analyzed: 25-Jun-2009

Strontium	89.2	4.00	mg/kg		87.4			2.08	20	
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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907026 - Default Prep Metals

Blank (B907026-BLK1)

Prepared & Analyzed: 25-Jun-2009

Strontium	ND	0.0800	mg/L							U
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Blank (B907026-BLK2)

Prepared & Analyzed: 25-Jun-2009

Strontium	ND	0.0800	mg/L							U
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Blank (B907026-BLK3)

Prepared & Analyzed: 25-Jun-2009

Strontium	ND	0.0800	mg/L							U
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Blank (B907026-BLK4)

Prepared & Analyzed: 25-Jun-2009

Strontium	ND	0.0800	mg/L							U
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Duplicate (B907026-DUP1)

Source: 9061502-76

Prepared & Analyzed: 25-Jun-2009

Strontium	0.362	0.0800	mg/L		0.359			0.800	20	
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Batch B907033 - EPA 3050B

Blank (B907033-BLK1)

Prepared: 17-Jul-2009 Analyzed: 20-Jul-2009

Antimony	ND	0.500	mg/kg							U
Arsenic	ND	0.500	mg/kg							U
Barium	ND	0.500	mg/kg							U
Beryllium	ND	0.500	mg/kg							U
Cadmium	ND	0.500	mg/kg							U
Chromium	ND	0.500	mg/kg							U
Cobalt	ND	0.500	mg/kg							U
Copper	ND	0.500	mg/kg							U
Lead	ND	0.500	mg/kg							U
Manganese	ND	0.500	mg/kg							U
Molybdenum	ND	0.500	mg/kg							U
Nickel	ND	0.500	mg/kg							U
Selenium	ND	0.500	mg/kg							U
Silver	ND	0.500	mg/kg							U
Thallium	ND	0.500	mg/kg							U
Vanadium	ND	0.500	mg/kg							U
Zinc	0.153	0.500	mg/kg							J



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ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907033 - EPA 3050B

Blank (B907033-BLK2)

Prepared: 17-Jul-2009 Analyzed: 20-Jul-2009

Antimony	0.485	0.500	mg/kg							J
Arsenic	ND	0.500	mg/kg							U
Barium	0.113	0.500	mg/kg							J
Beryllium	ND	0.500	mg/kg							U
Cadmium	ND	0.500	mg/kg							U
Chromium	ND	0.500	mg/kg							U
Cobalt	ND	0.500	mg/kg							U
Copper	ND	0.500	mg/kg							U
Lead	0.217	0.500	mg/kg							J
Manganese	ND	0.500	mg/kg							U
Molybdenum	ND	0.500	mg/kg							U
Nickel	ND	0.500	mg/kg							U
Selenium	ND	0.500	mg/kg							U
Silver	ND	0.500	mg/kg							U
Thallium	ND	0.500	mg/kg							U
Vanadium	ND	0.500	mg/kg							U
Zinc	0.514	0.500	mg/kg							

LCS (B907033-BS1)

Prepared: 17-Jul-2009 Analyzed: 20-Jul-2009

Antimony	2.53	0.500	mg/kg	2.500		101	80-120			
Arsenic	2.52	0.500	mg/kg	2.500		101	80-120			
Barium	2.57	0.500	mg/kg	2.500		103	80-120			
Beryllium	2.54	0.500	mg/kg	2.500		102	80-120			
Cadmium	2.63	0.500	mg/kg	2.500		105	80-120			
Chromium	2.52	0.500	mg/kg	2.500		101	80-120			
Cobalt	2.56	0.500	mg/kg	2.500		102	80-120			
Copper	2.54	0.500	mg/kg	2.500		101	80-120			
Lead	2.55	0.500	mg/kg	2.500		102	80-120			
Manganese	2.43	0.500	mg/kg	2.500		97.0	80-120			
Molybdenum	2.50	0.500	mg/kg	2.500		100	80-120			
Nickel	2.55	0.500	mg/kg	2.500		102	80-120			
Selenium	2.56	0.500	mg/kg	2.500		102	80-120			
Silver	2.54	0.500	mg/kg	2.500		102	80-120			
Thallium	2.51	0.500	mg/kg	2.500		100	80-120			
Vanadium	2.51	0.500	mg/kg	2.500		100	80-120			
Zinc	2.57	0.500	mg/kg	2.500		103	80-120			B

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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907033 - EPA 3050B

LCS (B907033-BS2)

Prepared: 17-Jul-2009 Analyzed: 20-Jul-2009

Antimony	96.3	0.500	mg/kg	100.0		96.3	80-120			
Arsenic	45.5	0.500	mg/kg	50.00		91.0	80-120			
Barium	196	0.500	mg/kg	200.0		97.9	80-120			
Beryllium	45.2	0.500	mg/kg	50.00		90.3	80-120			
Cadmium	47.2	0.500	mg/kg	50.00		94.4	80-120			
Chromium	97.5	0.500	mg/kg	100.0		97.5	80-120			
Cobalt	98.4	0.500	mg/kg	100.0		98.4	80-120			
Copper	95.5	0.500	mg/kg	100.0		95.5	80-120			
Lead	99.5	0.500	mg/kg	100.0		99.5	80-120			
Manganese	239	0.500	mg/kg	250.0		95.7	80-120			
Molybdenum	49.7	0.500	mg/kg	50.00		99.4	80-120			
Nickel	96.6	0.500	mg/kg	100.0		96.6	80-120			
Selenium	42.9	0.500	mg/kg	50.00		85.9	80-120			
Silver	48.2	0.500	mg/kg	50.00		96.5	80-120			
Thallium	48.7	0.500	mg/kg	50.00		97.4	80-120			
Vanadium	96.9	0.500	mg/kg	100.0		96.9	80-120			
Zinc	168	0.500	mg/kg	200.0		84.0	80-120			B

Duplicate (B907033-DUP1)

Source: 9071602-01

Prepared: 17-Jul-2009 Analyzed: 20-Jul-2009

Antimony	0.146	0.500	mg/kg		0.141		3.30	20		J
Arsenic	2.83	0.500	mg/kg		2.89		2.00	20		
Barium	19.6	0.500	mg/kg		29.5		40.4	20		
Beryllium	0.172	0.500	mg/kg		0.167		2.99	20		J
Cadmium	0.374	0.500	mg/kg		0.393		4.86	20		J
Chromium	18.4	0.500	mg/kg		16.5		10.6	20		
Cobalt	1.23	0.500	mg/kg		1.09		11.5	20		
Copper	5.10	0.500	mg/kg		4.87		4.63	20		
Lead	1.57	0.500	mg/kg		1.83		15.3	20		
Manganese	6.40	0.500	mg/kg		6.31		1.45	20		
Molybdenum	0.489	0.500	mg/kg		0.458		6.58	20		J
Nickel	10.4	0.500	mg/kg		9.52		8.43	20		
Selenium	0.592	0.500	mg/kg		0.709		18.0	20		
Silver	0.512	0.500	mg/kg		0.462		10.3	20		
Thallium	0.189	0.500	mg/kg		0.195		2.97	20		J
Vanadium	4.22	0.500	mg/kg		4.12		2.45	20		
Zinc	25.4	0.500	mg/kg		24.8		2.07	20		B

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907033 - EPA 3050B

Matrix Spike (B907033-MS1)

Source: 9071602-01

Prepared: 17-Jul-2009 Analyzed: 20-Jul-2009

Antimony	254	0.500	mg/kg	259.1	0.141	98.1	80-120			
Arsenic	129	0.500	mg/kg	129.5	2.89	97.5	80-120			
Barium	560	0.500	mg/kg	518.1	29.5	102	80-120			
Beryllium	129	0.500	mg/kg	129.5	0.167	99.3	80-120			
Cadmium	130	0.500	mg/kg	129.5	0.393	99.9	80-120			
Chromium	297	0.500	mg/kg	259.1	16.5	108	80-120			
Cobalt	274	0.500	mg/kg	259.1	1.09	106	80-120			
Copper	267	0.500	mg/kg	259.1	4.87	101	80-120			
Lead	272	0.500	mg/kg	259.1	1.83	104	80-120			
Manganese	662	0.500	mg/kg	647.7	6.31	101	80-120			
Molybdenum	137	0.500	mg/kg	129.5	0.458	105	80-120			
Nickel	279	0.500	mg/kg	259.1	9.52	104	80-120			
Selenium	116	0.500	mg/kg	129.5	0.709	89.3	80-120			
Silver	130	0.500	mg/kg	129.5	0.462	100	80-120			
Thallium	131	0.500	mg/kg	129.5	0.195	101	80-120			
Vanadium	275	0.500	mg/kg	259.1	4.12	104	80-120			
Zinc	495	0.500	mg/kg	518.1	24.8	90.8	80-120			

B

Batch B907036 - EPA 7471A Prep

Blank (B907036-BLK1)

Prepared: 06-Jul-2009 Analyzed: 22-Jul-2009

Mercury	ND	0.00400	mg/kg							
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Blank (B907036-BLK2)

Prepared: 06-Jul-2009 Analyzed: 22-Jul-2009

Mercury	ND	0.00400	mg/kg							
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LCS (B907036-BS1)

Prepared: 06-Jul-2009 Analyzed: 22-Jul-2009

Mercury	0.0609	0.00400	mg/kg	0.06000		101	75-125			
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Project Manager: Tony Bednar

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DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907036 - EPA 7471A Prep

LCS (B907036-BS2)

Prepared: 06-Jul-2009 Analyzed: 22-Jul-2009

Mercury	0.0670	0.00400	mg/kg	0.06000		112	75-125			
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Duplicate (B907036-DUP1)

Source: 9061502-05

Prepared: 06-Jul-2009 Analyzed: 22-Jul-2009

Mercury	0.0132	0.00395	mg/kg		0.0110			18.7	25	
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Matrix Spike (B907036-MS1)

Source: 9061502-05

Prepared: 06-Jul-2009 Analyzed: 22-Jul-2009

Mercury	0.0699	0.00398	mg/kg	0.05971	0.0110	98.7	75-125			
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Batch B907044 - EPA 7471A Prep

Blank (B907044-BLK1)

Prepared & Analyzed: 22-Jul-2009

Mercury	ND	0.002	mg/kg							U
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Blank (B907044-BLK2)

Prepared & Analyzed: 22-Jul-2009

Mercury	ND	0.002	mg/kg							U
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LCS (B907044-BS1)

Prepared & Analyzed: 22-Jul-2009

Mercury	0.0609	0.002	mg/kg	0.06000		101	75-125			
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LCS (B907044-BS2)

Prepared & Analyzed: 22-Jul-2009

Mercury	0.0670	0.002	mg/kg	0.06000		112	75-125			
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Batch B907052 - EPA 7470A Prep

Blank (B907052-BLK1)

Prepared & Analyzed: 24-Jul-2009

Mercury	ND	0.000005	mg/L							U
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Project Manager: Tony Bednar

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DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907052 - EPA 7470A Prep

Blank (B907052-BLK2)		Prepared & Analyzed: 24-Jul-2009								U
Mercury	ND	0.000005	mg/L							
Duplicate (B907052-DUP2)		Source: 9061502-76		Prepared: 24-Jul-2009 Analyzed: 21-Aug-2009						
Mercury	0.00039	0.000005	mg/L		0.000445			13.1	25	
Duplicate (B907052-DUP3)		Source: 9061503-25		Prepared: 24-Jul-2009 Analyzed: 21-Aug-2009						
Mercury	0.000576	0.000005	mg/L		0.000435			28.0	25	
Duplicate (B907052-DUP4)		Source: 9061701-13		Prepared: 24-Jul-2009 Analyzed: 21-Aug-2009						
Mercury	0.000167	0.000005	mg/L		0.000177			5.95	25	
Duplicate (B907052-DUP5)		Source: 9062302-13		Prepared: 24-Jul-2009 Analyzed: 21-Aug-2009						
Mercury	0.000175	0.000005	mg/L		0.000205			16.0	25	
Matrix Spike (B907052-MS2)		Source: 9061502-76		Prepared: 24-Jul-2009 Analyzed: 21-Aug-2009						
Mercury	0.000594	0.000005	mg/L	2.000E-4	0.000445	74.6	75-125			
Matrix Spike (B907052-MS3)		Source: 9061503-25		Prepared: 24-Jul-2009 Analyzed: 21-Aug-2009						
Mercury	0.000746	0.000005	mg/L	4.000E-4	0.000435	77.7	75-125			
Matrix Spike (B907052-MS4)		Source: 9061701-13		Prepared: 24-Jul-2009 Analyzed: 21-Aug-2009						
Mercury	0.000318	0.000005	mg/L	2.000E-4	0.000177	70.6	75-125			
Matrix Spike (B907052-MS5)		Source: 9062302-13		Prepared: 24-Jul-2009 Analyzed: 21-Aug-2009						
Mercury	0.000317	0.000005	mg/L	1.000E-4	0.000205	112	75-125			
Matrix Spike Dup (B907052-MSD2)		Source: 9061502-76		Prepared: 24-Jul-2009 Analyzed: 21-Aug-2009						
Mercury	0.000658	0.000005	mg/L	2.000E-4	0.000445	107	75-125	35.4	25	

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ERDC - ECB

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Project Manager: Tony Bednar

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DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907052 - EPA 7470A Prep

Matrix Spike Dup (B907052-MSD3)

Source: 9061503-25

Prepared: 24-Jul-2009 Analyzed: 21-Aug-2009

Mercury	0.000829	0.000005	mg/L	4.000E-4	0.000435	98.5	75-125	23.6	25	
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Matrix Spike Dup (B907052-MSD4)

Source: 9061701-13

Prepared: 24-Jul-2009 Analyzed: 21-Aug-2009

Mercury	0.000338	0.000005	mg/L	2.000E-4	0.000177	80.8	75-125	13.5	25	
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Matrix Spike Dup (B907052-MSD5)

Source: 9062302-13

Prepared: 24-Jul-2009 Analyzed: 21-Aug-2009

Mercury	0.000327	0.000005	mg/L	1.000E-4	0.000205	122	75-125	8.04	25	
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Batch B908051 - EPA 3050B

Blank (B908051-BLK1)

Prepared: 28-Aug-2009 Analyzed: 29-Aug-2009

Antimony	ND	0.400	mg/kg							U
Arsenic	ND	0.400	mg/kg							U
Barium	ND	0.400	mg/kg							U
Beryllium	ND	0.400	mg/kg							U
Cadmium	ND	0.400	mg/kg							U
Chromium	ND	0.400	mg/kg							U
Cobalt	ND	0.400	mg/kg							U
Copper	ND	0.400	mg/kg							U
Lead	1.22	0.400	mg/kg							
Manganese	ND	0.400	mg/kg							U
Molybdenum	ND	0.400	mg/kg							U
Nickel	ND	0.400	mg/kg							U
Selenium	ND	0.400	mg/kg							U
Silver	ND	0.400	mg/kg							U
Thallium	ND	0.400	mg/kg							U
Vanadium	ND	0.400	mg/kg							U
Zinc	0.348	0.400	mg/kg							J



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DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B908051 - EPA 3050B

Blank (B908051-BLK2)

Prepared: 28-Aug-2009 Analyzed: 29-Aug-2009

Antimony	0.498	0.400	mg/kg							
Arsenic	ND	0.400	mg/kg							U
Barium	ND	0.400	mg/kg							U
Beryllium	ND	0.400	mg/kg							U
Cadmium	ND	0.400	mg/kg							U
Chromium	ND	0.400	mg/kg							U
Cobalt	ND	0.400	mg/kg							U
Copper	ND	0.400	mg/kg							U
Lead	ND	0.400	mg/kg							U
Manganese	ND	0.400	mg/kg							U
Molybdenum	ND	0.400	mg/kg							U
Nickel	ND	0.400	mg/kg							U
Selenium	ND	0.400	mg/kg							U
Silver	ND	0.400	mg/kg							U
Thallium	ND	0.400	mg/kg							U
Vanadium	ND	0.400	mg/kg							U
Zinc	0.365	0.400	mg/kg							J

LCS (B908051-BS1)

Prepared: 28-Aug-2009 Analyzed: 29-Aug-2009

Antimony	93.0	0.400	mg/kg	100.0		93.0	80-120			B
Arsenic	46.3	0.400	mg/kg	50.00		92.6	80-120			
Barium	194	0.400	mg/kg	200.0		97.1	80-120			
Beryllium	48.2	0.400	mg/kg	50.00		96.4	80-120			
Cadmium	46.6	0.400	mg/kg	50.00		93.1	80-120			
Chromium	100	0.400	mg/kg	100.0		100	80-120			
Cobalt	102	0.400	mg/kg	100.0		102	80-120			
Copper	97.4	0.400	mg/kg	100.0		97.4	80-120			
Lead	99.3	0.400	mg/kg	100.0		99.3	80-120			B
Manganese	233	0.400	mg/kg	250.0		93.2	80-120			
Molybdenum	48.0	0.400	mg/kg	50.00		95.9	80-120			
Nickel	100	0.400	mg/kg	100.0		100	80-120			
Selenium	42.8	0.400	mg/kg	50.00		85.6	80-120			
Silver	46.9	0.400	mg/kg	50.00		93.7	80-120			
Thallium	47.8	0.400	mg/kg	50.00		95.6	80-120			
Vanadium	99.7	0.400	mg/kg	100.0		99.7	80-120			
Zinc	176	0.400	mg/kg	200.0		88.2	80-120			

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

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03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B908051 - EPA 3050B

LCS (B908051-BS2)

Prepared: 28-Aug-2009 Analyzed: 29-Aug-2009

Antimony	95.7	0.400	mg/kg	100.0		95.7	80-120			B
Arsenic	46.8	0.400	mg/kg	50.00		93.6	80-120			
Barium	197	0.400	mg/kg	200.0		98.3	80-120			
Beryllium	47.3	0.400	mg/kg	50.00		94.5	80-120			
Cadmium	46.4	0.400	mg/kg	50.00		92.8	80-120			
Chromium	101	0.400	mg/kg	100.0		101	80-120			
Cobalt	100	0.400	mg/kg	100.0		100	80-120			
Copper	96.5	0.400	mg/kg	100.0		96.5	80-120			
Lead	97.5	0.400	mg/kg	100.0		97.5	80-120			B
Manganese	235	0.400	mg/kg	250.0		94.2	80-120			
Molybdenum	48.6	0.400	mg/kg	50.00		97.1	80-120			
Nickel	97.8	0.400	mg/kg	100.0		97.8	80-120			
Selenium	43.1	0.400	mg/kg	50.00		86.1	80-120			
Silver	46.7	0.400	mg/kg	50.00		93.4	80-120			
Thallium	48.3	0.400	mg/kg	50.00		96.7	80-120			
Vanadium	99.5	0.400	mg/kg	100.0		99.5	80-120			
Zinc	176	0.400	mg/kg	200.0		88.2	80-120			

Duplicate (B908051-DUP1)

Source: 9082706-03

Prepared: 28-Aug-2009 Analyzed: 29-Aug-2009

Antimony	0.721	0.400	mg/kg		ND			20		B
Arsenic	0.113	0.400	mg/kg		ND			20		J
Barium	2.62	0.400	mg/kg		1.84			35.0	20	
Beryllium	ND	0.400	mg/kg		ND			20		U
Cadmium	ND	0.400	mg/kg		ND			20		U
Chromium	2.01	0.400	mg/kg		1.79			11.6	20	
Cobalt	ND	0.400	mg/kg		ND			20		U
Copper	0.878	0.400	mg/kg		0.663			27.9	20	
Lead	0.397	0.400	mg/kg		0.588			38.9	20	J, B
Manganese	0.970	0.400	mg/kg		0.742			26.6	20	
Molybdenum	0.096	0.400	mg/kg		ND			20		J
Nickel	1.51	0.400	mg/kg		1.20			22.9	20	
Selenium	0.182	0.400	mg/kg		0.087			70.3	20	J
Silver	0.143	0.400	mg/kg		ND			20		J
Thallium	ND	0.400	mg/kg		ND			20		U
Vanadium	0.081	0.400	mg/kg		ND			20		J
Zinc	31.5	0.400	mg/kg		22.5			33.1	20	

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Project Manager: Tony Bednar

Reported:
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DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B908051 - EPA 3050B

Matrix Spike (B908051-MS1)		Source: 9082706-03			Prepared: 28-Aug-2009 Analyzed: 29-Aug-2009					
Antimony	172	0.400	mg/kg	170.2	ND	101	80-120			B
Arsenic	87.7	0.400	mg/kg	85.09	ND	103	80-120			
Barium	360	0.400	mg/kg	340.4	1.84	105	80-120			
Beryllium	85.0	0.400	mg/kg	85.09	ND	99.9	80-120			
Cadmium	84.2	0.400	mg/kg	85.09	ND	98.9	80-120			
Chromium	189	0.400	mg/kg	170.2	1.79	110	80-120			
Cobalt	184	0.400	mg/kg	170.2	ND	108	80-120			
Copper	180	0.400	mg/kg	170.2	0.663	105	80-120			
Lead	175	0.400	mg/kg	170.2	0.588	102	80-120			B
Manganese	435	0.400	mg/kg	425.5	0.742	102	80-120			
Molybdenum	90.5	0.400	mg/kg	85.09	ND	106	80-120			
Nickel	181	0.400	mg/kg	170.2	1.20	106	80-120			
Selenium	79.7	0.400	mg/kg	85.09	0.087	93.6	80-120			
Silver	84.7	0.400	mg/kg	85.09	ND	99.6	80-120			
Thallium	87.5	0.400	mg/kg	85.09	ND	103	80-120			
Vanadium	184	0.400	mg/kg	170.2	ND	108	80-120			
Zinc	368	0.400	mg/kg	340.4	22.5	102	80-120			

Batch B909005 - EPA 7471A Prep

Blank (B909005-BLK1)		Prepared & Analyzed: 03-Sep-2009								
Mercury	ND	0.002	mg/kg							U
Blank (B909005-BLK2)		Prepared & Analyzed: 03-Sep-2009								
Mercury	ND	0.002	mg/kg							U
LCS (B909005-BS1)		Prepared & Analyzed: 03-Sep-2009								
Mercury	0.0691	0.002	mg/kg	0.06000		115	75-125			



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

03-Sep-2009

DRAFT: Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B909005 - EPA 7471A Prep

LCS (B909005-BS2)

Prepared & Analyzed: 03-Sep-2009

Mercury	0.0688	0.002	mg/kg	0.06000	115	75-125
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Duplicate (B909005-DUP1)

Source: 9082706-02

Prepared & Analyzed: 03-Sep-2009

Mercury	0.0119	0.004	mg/kg	0.0109	8.38	25
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Matrix Spike (B909005-MS1)

Source: 9082706-02

Prepared & Analyzed: 03-Sep-2009

Mercury	0.127	0.004	mg/kg	0.1251	0.0109	92.8	75-125
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Project Manager: Tony Bednar

Reported:
03-Sep-2009

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B906084 - TS/TSS/TDS Prep

Blank (B906084-BLK1)

Prepared & Analyzed: 25-Jun-2009

Total Solids	15.0	10.0	mg/L
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Duplicate (B906084-DUP1)

Source: 9062302-04

Prepared & Analyzed: 25-Jun-2009

Total Solids	695	10.0	mg/L	700	0.717	30
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Batch B906085 - TS/TSS/TDS Prep

Blank (B906085-BLK1)

Prepared & Analyzed: 25-Jun-2009

Total Suspended Solids	ND	25.0	mg/L
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Duplicate (B906085-DUP1)

Source: 9062302-09

Prepared & Analyzed: 25-Jun-2009

Total Suspended Solids	425	25.0	mg/L	410	3.59	20
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Batch B906086 - TS/TSS/TDS Prep

Blank (B906086-BLK1)

Prepared & Analyzed: 25-Jun-2009

Total Dissolved Solids	ND	25.0	mg/L
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Duplicate (B906086-DUP1)

Prepared & Analyzed: 25-Jun-2009

Total Dissolved Solids	245	25.0	mg/L			20
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Batch B907020 - Default Prep GenChem

Blank (B907020-BLK2)

Prepared & Analyzed: 14-Jul-2009

Chloride	ND	1.00	mg/L
Sulfate	ND	0.100	mg/L
Bromide	ND	0.100	mg/L
Nitrate as N	ND	0.100	mg/L

U



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Reported:
03-Sep-2009

--, - Project Manager: Tony Bednar

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907020 - Default Prep GenChem

Duplicate (B907020-DUP1)		Source: 9061502-24		Prepared & Analyzed: 14-Jul-2009						
Chloride	2.34	1.00	mg/L		2.36			0.851	20	
Sulfate	12.2	0.100	mg/L		12.5			2.19	20	
Bromide	ND	0.100	mg/L		ND				20	
Nitrate as N	0.390	0.100	mg/L		0.400			2.53	20	

Duplicate (B907020-DUP2)		Source: 9061502-41		Prepared & Analyzed: 14-Jul-2009						
Chloride	2.60	1.00	mg/L		2.60			0.00	20	
Sulfate	13.3	0.100	mg/L		13.2			0.452	20	
Bromide	ND	0.100	mg/L		ND				20	
Nitrate as N	0.390	0.100	mg/L		0.396			1.53	20	

Batch B907021 - Default Prep GenChem

Blank (B907021-BLK1)		Prepared & Analyzed: 15-Jul-2009								
Chloride	ND	1.00	mg/L							
Sulfate	ND	0.100	mg/L							
Bromide	ND	0.100	mg/L							
Nitrate as N	ND	0.100	mg/L							U

Duplicate (B907021-DUP1)		Source: 9061503-06		Prepared & Analyzed: 15-Jul-2009						
Chloride	2.50	1.00	mg/L		2.49			0.356	20	
Sulfate	12.7	0.100	mg/L		12.6			0.994	20	
Bromide	ND	0.100	mg/L		ND				20	
Nitrate as N	0.438	0.100	mg/L		0.415			5.32	20	

Matrix Spike (B907021-MS1)		Source: 9061503-06		Prepared & Analyzed: 15-Jul-2009						
Nitrate as N	4.61	0.100	mg/L		0.415			85-115		



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03-Sep-2009

DRAFT: Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B907021 - Default Prep GenChem

Matrix Spike Dup (B907021-MSD1)

Source: 9061503-06

Prepared & Analyzed: 15-Jul-2009

Nitrate as N	4.68	0.100	mg/L		0.415		85-115	1.51	20	
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Batch B907022 - Default Prep GenChem

Duplicate (B907022-DUP1)

Source: 9061701-03

Prepared: 15-Jul-2009 Analyzed: 16-Jul-2009

Chloride	2.68	1.00	mg/L		2.68			0.201	20	
Sulfate	12.9	0.100	mg/L		12.9			0.102	20	
Bromide	ND	0.100	mg/L		ND				20	
Nitrate as N	0.390	0.100	mg/L		0.393			0.562	20	



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03-Sep-2009

Notes and Definitions

U	Analyte included in the analysis, but not detected
J	Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag).
B	Analyte is found in the associated blank as well as in the sample (CLP B-flag).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference



**USACE ERDC-EP-C
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03 September 2009

Tony Bednar
ERDC - ECB

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RE: TVA Fly Ash Project

Enclosed are the results of analyses for samples received by the laboratory on 27-Aug-2009. The samples associated with this report will be held for 90 days from the date of this report. The raw data associated with this report will be held for 5 years from the date of this report. If you need us to hold onto the samples or the data longer than these specified times, you will need to notify us in writing at least 30 days before the expiration dates. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Patty Tuminello
Project Coordinator



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

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Project: TVA Fly Ash Project

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Reported:

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Project Manager: Tony Bednar

03-Sep-2009

WORK ORDER SUMMARY

Sample ID	Laboratory ID	Matrix	Date Sampled	Date of Work Order
Fish Tissue Dechlor 1	9082706-01	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue Dechlor 2	9082706-02	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue Dechlor 3	9082706-03	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue Dechlor 4	9082706-04	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue Dechlor 5	9082706-05	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue EMR - WA 1	9082706-06	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue EMR - WA 2	9082706-07	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue EMR - WA 3	9082706-08	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue EMR - WA 4	9082706-09	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue EMR - WA 5	9082706-10	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue EMR - EL 1	9082706-11	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue EMR - EL 2	9082706-12	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue EMR - EL 3	9082706-13	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue EMR - EL 4	9082706-14	Tissue	26-Aug-2009	27-Aug-2009
Fish Tissue EMR - EL 5	9082706-15	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut Dechlor 1	9082706-16	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut Dechlor 2	9082706-17	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut Dechlor 3	9082706-18	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut Dechlor 4	9082706-19	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut Dechlor 5	9082706-20	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut EMR - WA 1	9082706-21	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut EMR - WA 2	9082706-22	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut EMR - WA 3	9082706-23	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut EMR - WA 4	9082706-24	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut EMR - WA 5	9082706-25	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut EMR - EL 1	9082706-26	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut EMR - EL 2	9082706-27	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut EMR - EL 3	9082706-28	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut EMR - EL 4	9082706-29	Tissue	26-Aug-2009	27-Aug-2009
Fish Gut EMR - EL 5	9082706-30	Tissue	26-Aug-2009	27-Aug-2009

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue Dechlor 1
9082706-01 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.007	0.003	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.101	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	2.28	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	6.45	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	0.104	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	1.62	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	1.52	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	1.51	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.124	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	4.68	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.158	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	0.193	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.094	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	19.0	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue Dechlor 2

9082706-02 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.011	0.005	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.084	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	1.97	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	15.2	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	0.159	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	1.01	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	3.49	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	2.05	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.298	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	7.50	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.110	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	0.116	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.121	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	13.6	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue Dechlor 3

9082706-03 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.007	0.004	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	1.84	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	1.79	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.663	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.588	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	0.742	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	1.20	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.087	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Zinc	22.5	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	

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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue Dechlor 4

9082706-04 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.009	0.003	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	0.084	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	1.61	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	4.04	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.806	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.590	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	1.02	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.083	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	2.29	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.112	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.098	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	17.8	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue Dechlor 5

9082706-05 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.013	0.004	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.105	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	2.46	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	11.4	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	0.088	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	0.854	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.256	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	1.54	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.193	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	5.78	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.163	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	0.080	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.109	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	19.7	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue EMR - WA 1

9082706-06 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.011	0.003	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	0.426	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Arsenic	0.184	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	4.15	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	9.76	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	0.136	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	2.13	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.414	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	2.00	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.203	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	5.05	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.229	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	0.156	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.259	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	39.0	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue EMR - WA 2

9082706-07 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.013	0.004	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	0.247	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	0.112	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	3.26	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	3.25	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.846	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.502	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	0.995	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	2.11	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.245	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	0.119	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.245	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	25.3	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue EMR - WA 3

9082706-08 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.010	0.004	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	0.205	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	0.083	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	1.96	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	7.14	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.722	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.480	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	1.17	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.110	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	3.66	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.108	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	0.238	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.096	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	16.0	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue EMR - WA 4

9082706-09 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.006	0.003	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.099	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	4.02	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	8.94	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	0.097	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	1.33	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.392	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	1.70	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.156	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	4.78	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.208	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.123	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	19.6	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Reported:
03-Sep-2009

Fish Tissue EMR - WA 5

9082706-10 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.015	0.006	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.119	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	3.31	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	12.6	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	0.092	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	0.994	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.414	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	2.11	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	0.194	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	6.22	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.240	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.160	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	26.1	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue EMR - EL 1

9082706-11 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.013	0.005	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.493	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	4.18	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	2.74	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.992	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.356	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	1.21	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	1.65	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.294	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.669	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Zinc	28.6	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue EMR - EL 2

9082706-12 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.013	0.005	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.470	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	4.03	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	2.97	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.847	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.305	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	1.12	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	1.72	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.335	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.386	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	28.8	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue EMR - EL 3

9082706-13 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.015	0.004	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	0.266	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	0.220	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	2.20	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	1.19	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	1.21	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.352	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	0.619	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	0.767	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.200	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.224	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	23.1	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue EMR - EL 4

9082706-14 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	0.009	0.004	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.199	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	2.06	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	3.99	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.787	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.350	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	0.848	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	2.09	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.171	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.358	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	20.1	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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3909 Halls Ferry Road
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ERDC - ECB

Project: TVA Fly Ash Project

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Tissue EMR - EL 5

9082706-15 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Mercury	ND	0.005	mg/kg	1	03-Sep-2009	03-Sep-2009	EPA 7471A	U
Antimony	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	0.224	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Barium	3.43	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	6.07	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	0.771	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	0.295	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Manganese	1.07	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	3.67	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	0.190	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	0.338	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	21.2	0.400	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	

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03-Sep-2009

Fish Gut Dechlor 1
9082706-16 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	1060	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	1020	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	17.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	460	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	169	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	3090	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	66.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	13.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	28.0	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	2370	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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03-Sep-2009

Fish Gut Dechlor 2

9082706-17 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	27.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	299	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	224	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	21.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Copper	167	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	172	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	727	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	66.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	9.40	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	1080	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Fish Gut Dechlor 3
9082706-18 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	210	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	184	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	107	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	77.5	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	586	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	25.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Zinc	700	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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03-Sep-2009

Fish Gut Dechlor 4
9082706-19 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	358	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	272	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	566	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	96.0	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	987	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	53.6	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	14.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	1170	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Fish Gut Dechlor 5
9082706-20 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	110	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	195	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	99.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	86.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	199	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	57.0	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Zinc	551	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Fish Gut EMR - WA 1

9082706-21 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	348	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	94.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	135	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	90.7	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	488	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	31.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	16.9	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	12.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	1490	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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03-Sep-2009

Fish Gut EMR - WA 2

9082706-22 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	218	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	48.8	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	83.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	66.5	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	231	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	32.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Zinc	869	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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03-Sep-2009

Fish Gut EMR - WA 3

9082706-23 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	481	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	189	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	181	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	123	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	786	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	70.8	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	10.6	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	20.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	1670	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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03-Sep-2009

Fish Gut EMR - WA 4

9082706-24 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	25.0	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	517	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	168	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	160	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	112	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	728	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	45.9	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	9.18	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	18.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	1620	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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ERDC - ECB

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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Fish Gut EMR - WA 5

9082706-25 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Barium	351	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	96.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Copper	109	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	100	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	479	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Nickel	32.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	14.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Zinc	1280	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Reported:
03-Sep-2009

Fish Gut EMR - EL 1

9082706-26 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Arsenic	183	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	1280	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	10.9	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	138	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	55.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Copper	242	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	114	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	317	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	11.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	118	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	286	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Zinc	382	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Fish Gut EMR - EL 2

9082706-27 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	46.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Arsenic	1390	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	11100	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	93.6	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cadmium	60.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Chromium	1120	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	468	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Copper	2280	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	970	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	2710	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	94.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Nickel	1010	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	36.0	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	165	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Thallium	38.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Vanadium	2360	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Zinc	3570	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Fish Gut EMR - EL 3

9082706-28 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	23.6	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	611	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	6140	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	51.8	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cadmium	34.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Chromium	611	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	252	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Copper	1170	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	550	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	1480	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	50.9	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Nickel	560	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	12.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Silver	27.6	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Thallium	19.4	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Vanadium	1300	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Zinc	2440	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

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03-Sep-2009

Fish Gut EMR - EL 4

9082706-29 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	25.6	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	734	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	6380	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	53.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cadmium	32.0	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Chromium	625	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	261	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Copper	1180	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	1600	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	1520	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	52.5	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Nickel	580	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	20.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Vanadium	1340	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Zinc	2460	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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03-Sep-2009

Fish Gut EMR - EL 5

9082706-30 (Tissue)

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Notes
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ERDC- EL-EP-C (Environmental Chemistry Branch)

Metals by EPA 6000/7000 Series Methods

Antimony	15.3	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J, B
Arsenic	127	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Barium	1190	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Beryllium	10.7	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Cadmium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Chromium	116	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Cobalt	49.2	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Copper	217	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Lead	107	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	B
Manganese	281	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Molybdenum	10.1	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	J
Nickel	107	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Selenium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Silver	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Thallium	ND	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	U
Vanadium	243	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	
Zinc	474	40.0	mg/kg	2	28-Aug-2009	29-Aug-2009	SW 846/6020	



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Project Manager: Tony Bednar

Reported:
03-Sep-2009

Metals by EPA 6000/7000 Series Methods - Quality Control
ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B908051 - EPA 3050B

Blank (B908051-BLK1)

Prepared: 28-Aug-2009 Analyzed: 29-Aug-2009

Antimony	ND	0.400	mg/kg							U
Arsenic	ND	0.400	mg/kg							U
Barium	ND	0.400	mg/kg							U
Beryllium	ND	0.400	mg/kg							U
Cadmium	ND	0.400	mg/kg							U
Chromium	ND	0.400	mg/kg							U
Cobalt	ND	0.400	mg/kg							U
Copper	ND	0.400	mg/kg							U
Lead	1.22	0.400	mg/kg							
Manganese	ND	0.400	mg/kg							U
Molybdenum	ND	0.400	mg/kg							U
Nickel	ND	0.400	mg/kg							U
Selenium	ND	0.400	mg/kg							U
Silver	ND	0.400	mg/kg							U
Thallium	ND	0.400	mg/kg							U
Vanadium	ND	0.400	mg/kg							U
Zinc	0.348	0.400	mg/kg							J

Blank (B908051-BLK2)

Prepared: 28-Aug-2009 Analyzed: 29-Aug-2009

Antimony	0.498	0.400	mg/kg							
Arsenic	ND	0.400	mg/kg							U
Barium	ND	0.400	mg/kg							U
Beryllium	ND	0.400	mg/kg							U
Cadmium	ND	0.400	mg/kg							U
Chromium	ND	0.400	mg/kg							U
Cobalt	ND	0.400	mg/kg							U
Copper	ND	0.400	mg/kg							U
Lead	ND	0.400	mg/kg							U
Manganese	ND	0.400	mg/kg							U
Molybdenum	ND	0.400	mg/kg							U
Nickel	ND	0.400	mg/kg							U
Selenium	ND	0.400	mg/kg							U
Silver	ND	0.400	mg/kg							U
Thallium	ND	0.400	mg/kg							U
Vanadium	ND	0.400	mg/kg							U
Zinc	0.365	0.400	mg/kg							J

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03-Sep-2009

Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B908051 - EPA 3050B

LCS (B908051-BS1)

Prepared: 28-Aug-2009 Analyzed: 29-Aug-2009

Antimony	93.0	0.400	mg/kg	100.0		93.0	80-120			B
Arsenic	46.3	0.400	mg/kg	50.00		92.6	80-120			
Barium	194	0.400	mg/kg	200.0		97.1	80-120			
Beryllium	48.2	0.400	mg/kg	50.00		96.4	80-120			
Cadmium	46.6	0.400	mg/kg	50.00		93.1	80-120			
Chromium	100	0.400	mg/kg	100.0		100	80-120			
Cobalt	102	0.400	mg/kg	100.0		102	80-120			
Copper	97.4	0.400	mg/kg	100.0		97.4	80-120			
Lead	99.3	0.400	mg/kg	100.0		99.3	80-120			B
Manganese	233	0.400	mg/kg	250.0		93.2	80-120			
Molybdenum	48.0	0.400	mg/kg	50.00		95.9	80-120			
Nickel	100	0.400	mg/kg	100.0		100	80-120			
Selenium	42.8	0.400	mg/kg	50.00		85.6	80-120			
Silver	46.9	0.400	mg/kg	50.00		93.7	80-120			
Thallium	47.8	0.400	mg/kg	50.00		95.6	80-120			
Vanadium	99.7	0.400	mg/kg	100.0		99.7	80-120			
Zinc	176	0.400	mg/kg	200.0		88.2	80-120			

LCS (B908051-BS2)

Prepared: 28-Aug-2009 Analyzed: 29-Aug-2009

Antimony	95.7	0.400	mg/kg	100.0		95.7	80-120			B
Arsenic	46.8	0.400	mg/kg	50.00		93.6	80-120			
Barium	197	0.400	mg/kg	200.0		98.3	80-120			
Beryllium	47.3	0.400	mg/kg	50.00		94.5	80-120			
Cadmium	46.4	0.400	mg/kg	50.00		92.8	80-120			
Chromium	101	0.400	mg/kg	100.0		101	80-120			
Cobalt	100	0.400	mg/kg	100.0		100	80-120			
Copper	96.5	0.400	mg/kg	100.0		96.5	80-120			
Lead	97.5	0.400	mg/kg	100.0		97.5	80-120			B
Manganese	235	0.400	mg/kg	250.0		94.2	80-120			
Molybdenum	48.6	0.400	mg/kg	50.00		97.1	80-120			
Nickel	97.8	0.400	mg/kg	100.0		97.8	80-120			
Selenium	43.1	0.400	mg/kg	50.00		86.1	80-120			
Silver	46.7	0.400	mg/kg	50.00		93.4	80-120			
Thallium	48.3	0.400	mg/kg	50.00		96.7	80-120			
Vanadium	99.5	0.400	mg/kg	100.0		99.5	80-120			
Zinc	176	0.400	mg/kg	200.0		88.2	80-120			

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03-Sep-2009

Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B908051 - EPA 3050B

Duplicate (B908051-DUP1)

Source: 9082706-03

Prepared: 28-Aug-2009 Analyzed: 29-Aug-2009

Antimony	0.721	0.400	mg/kg		ND				20	B
Arsenic	0.113	0.400	mg/kg		ND				20	J
Barium	2.62	0.400	mg/kg		1.84			35.0	20	
Beryllium	ND	0.400	mg/kg		ND				20	U
Cadmium	ND	0.400	mg/kg		ND				20	U
Chromium	2.01	0.400	mg/kg		1.79			11.6	20	
Cobalt	ND	0.400	mg/kg		ND				20	U
Copper	0.878	0.400	mg/kg		0.663			27.9	20	
Lead	0.397	0.400	mg/kg		0.588			38.9	20	J, B
Manganese	0.970	0.400	mg/kg		0.742			26.6	20	
Molybdenum	0.096	0.400	mg/kg		ND				20	J
Nickel	1.51	0.400	mg/kg		1.20			22.9	20	
Selenium	0.182	0.400	mg/kg		0.087			70.3	20	J
Silver	0.143	0.400	mg/kg		ND				20	J
Thallium	ND	0.400	mg/kg		ND				20	U
Vanadium	0.081	0.400	mg/kg		ND				20	J
Zinc	31.5	0.400	mg/kg		22.5			33.1	20	

Matrix Spike (B908051-MS1)

Source: 9082706-03

Prepared: 28-Aug-2009 Analyzed: 29-Aug-2009

Antimony	172	0.400	mg/kg	170.2	ND	101	80-120			B
Arsenic	87.7	0.400	mg/kg	85.09	ND	103	80-120			
Barium	360	0.400	mg/kg	340.4	1.84	105	80-120			
Beryllium	85.0	0.400	mg/kg	85.09	ND	99.9	80-120			
Cadmium	84.2	0.400	mg/kg	85.09	ND	98.9	80-120			
Chromium	189	0.400	mg/kg	170.2	1.79	110	80-120			
Cobalt	184	0.400	mg/kg	170.2	ND	108	80-120			
Copper	180	0.400	mg/kg	170.2	0.663	105	80-120			
Lead	175	0.400	mg/kg	170.2	0.588	102	80-120			B
Manganese	435	0.400	mg/kg	425.5	0.742	102	80-120			
Molybdenum	90.5	0.400	mg/kg	85.09	ND	106	80-120			
Nickel	181	0.400	mg/kg	170.2	1.20	106	80-120			
Selenium	79.7	0.400	mg/kg	85.09	0.087	93.6	80-120			
Silver	84.7	0.400	mg/kg	85.09	ND	99.6	80-120			
Thallium	87.5	0.400	mg/kg	85.09	ND	103	80-120			
Vanadium	184	0.400	mg/kg	170.2	ND	108	80-120			
Zinc	368	0.400	mg/kg	340.4	22.5	102	80-120			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

-

Reported:
03-Sep-2009

--, - Project Manager: Tony Bednar

Metals by EPA 6000/7000 Series Methods - Quality Control
ERDC- EL-EP-C (Environmental Chemistry Branch)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B909005 - EPA 7471A Prep										
Blank (B909005-BLK1)				Prepared & Analyzed: 03-Sep-2009						
Mercury	ND	0.002	mg/kg							U
Blank (B909005-BLK2)				Prepared & Analyzed: 03-Sep-2009						
Mercury	ND	0.002	mg/kg							U
LCS (B909005-BS1)				Prepared & Analyzed: 03-Sep-2009						
Mercury	0.0691	0.002	mg/kg	0.06000		115	75-125			
LCS (B909005-BS2)				Prepared & Analyzed: 03-Sep-2009						
Mercury	0.0688	0.002	mg/kg	0.06000		115	75-125			
Duplicate (B909005-DUP1)				Source: 9082706-02		Prepared & Analyzed: 03-Sep-2009				
Mercury	0.0119	0.004	mg/kg		0.0109			8.38	25	
Matrix Spike (B909005-MS1)				Source: 9082706-02		Prepared & Analyzed: 03-Sep-2009				
Mercury	0.127	0.004	mg/kg	0.1251	0.0109	92.8	75-125			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC - ECB

Project: TVA Fly Ash Project

-

Reported:

--, -

Project Manager: Tony Bednar

03-Sep-2009

Notes and Definitions

U	Analyte included in the analysis, but not detected
J	Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag).
B	Analyte is found in the associated blank as well as in the sample (CLP B-flag).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Appendix E: TOC data, Grain Size Analysis, and Speciation Data Sheets

Appendix E. TOC data, Grain Size Analysis, and Speciation Data Sheets

Sample	Analysis	Area	Concentration %	Amt. Analyzed mg	mg/kg	TOC mg/kg
Source Pile	Total Carbon (TC)	986	5.196	146	51960	51840
	Inorganic Carbon (IC)	2.274	0.012	143	120	
SLC	Total Carbon (TC)	326.5	1.715	144	17150	16780
	Inorganic Carbon (IC)	7.252	0.037	149	370	
EMR	Total Carbon (TC)	862.8	4.51	147	45100	44930
	Inorganic Carbon (IC)	3.259	0.017	147	170	
RF 1	Total Carbon (TC)	300.1	1.892	119.7	18920	18920
	Inorganic Carbon (IC)	0	0	140.8	0	
RF 2	Total Carbon (TC)	339.5	1.937	132.7	19370	19370
	Inorganic Carbon (IC)	0	0	127.1	0	
RF 3	Total Carbon (TC)	73.4	0.375	134.7	3750	3490
	Inorganic Carbon (IC)	4.792	0.026	140.8	260	
RF 4	Total Carbon (TC)	464.4	2.816	125.7	28160	27400
	Inorganic Carbon (IC)	11.79	0.076	116.6	760	
RF 5	Total Carbon (TC)	1192	7.449	123.3	74490	69560
	Inorganic Carbon (IC)	76.13	0.493	116.8	4930	
RF 6	Total Carbon (TC)	800.2	4.333	141.8	43330	41850
	Inorganic Carbon (IC)	26.45	0.148	135	1480	

Report Number

09-189-0543

Page: 1 of 2

Account Number

00626

Send To : ERDC

Cynthia Price

Attn: Cynthia Price

3909 Halls Ferry Rd

Vicksburg , MS 39180

Client :



A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



The One Source.

Purchase Order :

Report Date: 7/21/2009

Date Received : 7/8/2009

REPORT OF ANALYSIS

Laboratory Number:	25625	25626	25627	25628	25629
Sample Date and Time:					
Sample Identification:	Emory	Sluice	Pile	PIL-FA-GT-A	PIL-FA-GT-B
Analysis:					
Very Coarse Particle (1-2 mm), %	0.029	0.738	1.75	2.39	1.58
Coarse Particle (.5-1 mm), %	0.119	0.659	2.28	2.31	2.24
Medium Particle (0.25-0.5 mm), %	0.317	1.03	2.90	2.80	2.96
Fine Particle (0.10-0.25 mm), %	1.31	3.20	7.40	6.75	7.22
Very Fine Particle (0.05-0.10 mm), %	5.00	8.09	13.7	13.4	14.1
Sand, %	6.78	13.7	28.0	27.6	28.1
Silt, %	93.0	86.0	71.6	72.1	71.6
Clay, %	0.248	0.246	0.347	0.258	0.215

Oscar Ruiz

Sample results are reported 'as received' and are not moisture corrected unless noted

Report Number

09-189-0543

Page: 2 of 2**A&L Analytical Laboratories, Inc.**

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440

**Account Number**

00626

Send To : ERDC

Cynthia Price

Attn: Cynthia Price

3909 Halls Ferry Rd

Vicksburg, MS 39180

Client :**Purchase Order :****Report Date:** 7/21/2009**Date Received :** 7/8/2009**REPORT OF ANALYSIS****Method Reference:**

Methods of Soil Analysis, Part 1 - Physical and Mineralogical Methods, 2nd Ed. Rev. Soil Science Society of America, Klute, A. et al. 1986, pages 394-396.

Oscar Ruiz

Sample results are reported 'as received' and are not moisture corrected unless noted

EMR (AS(III)/AS(V)) Time 0 Sample

-300mv					Activity					%species				
log activity														
pH	4	6	8	10						4	6	8	10	
AsO4-3	-38.369	-28.37	-18.398	-10.159	4.27563E-39	4.2658E-29	3.99945E-19	6.93426E-11	AsO4-3	7.43014E-29	7.40809E-19	6.95966E-09	1.339994182	
H2AsO3-	-13.41	-11.41	-9.439	-9.199	3.89045E-14	3.89045E-12	3.63915E-10	6.32412E-10	H2AsO3-	0.000676078	0.06756262	6.33268416	12.22089219	
H2AsO4-	-27.579	-21.58	-15.608	-11.369	2.63633E-28	2.63027E-22	2.46604E-16	4.27563E-12	H2AsO4-	4.58139E-18	4.56779E-12	4.29129E-06	0.082623372	
H3AsO3	-8.24	-8.24	-8.269	-10.029	5.7544E-09	5.7544E-09	5.3827E-09	9.35406E-11	H3AsO3	99.99932392	99.93243738	93.6672626	1.807602415	
H3AsO4	-29.279	-25.28	-21.308	-19.069	5.26017E-30	5.24807E-26	4.9204E-22	8.531E-20	H3AsO4	9.14107E-20	9.11395E-16	8.56225E-12	1.64855E-09	
HAsO3-2	-23.51	-19.51	-15.539	-13.299	3.0903E-24	3.0903E-20	2.89068E-16	5.02343E-14	HAsO3-2	5.37028E-14	5.36669E-10	5.03023E-06	0.00097074	
HAsO4-2	-30.569	-22.57	-14.598	-8.359	2.69774E-31	2.69153E-23	2.52348E-15	4.37522E-09	HAsO4-2	4.6881E-21	4.67419E-13	4.39125E-05	84.5479171	
total					5.75444E-09	5.75829E-09	5.74662E-09	5.17484E-09						
-100mv														
pH	4	6	8	10						4	6	8	10	
AsO4-3	-31.608	-21.608	-12.246	-10.099	2.46604E-32	2.46604E-22	5.67545E-13	7.96159E-11	AsO4-3	4.28546E-22	4.28259E-12	0.010617527	1.558666757	
H2AsO3-	-13.41	-11.41	-10.048	-15.901	3.89045E-14	3.89045E-12	8.95365E-11	1.25603E-16	H2AsO3-	0.000676078	0.0675626	1.675033035	2.45897E-06	
H2AsO4-	-20.818	-14.818	-9.456	-11.309	1.52055E-21	1.52055E-15	3.49945E-10	4.90908E-12	H2AsO4-	2.84239E-11	2.64062E-05	6.546714119	0.096106613	
H3AsO3	-8.24	-8.24	-8.878	-16.731	5.7544E-09	5.7544E-09	1.32434E-09	1.8578E-17	H3AsO3	99.99932392	99.93240829	24.77555412	3.63708E-07	
H3AsO4	-22.518	-18.518	-15.156	-19.009	3.03389E-23	3.03389E-19	6.98232E-16	9.7949E-20	H3AsO4	5.27226E-13	5.26873E-09	1.30624E-05	1.91758E-09	
HAsO3-2	-23.51	-19.51	-16.148	-20.001	3.0903E-24	3.0903E-20	7.11214E-17	9.977E-21	HAsO3-2	5.37028E-14	5.36669E-10	1.33053E-06	1.95323E-10	
HAsO4-2	-23.808	-15.808	-8.446	-8.299	1.55597E-24	1.55597E-16	3.58096E-09	5.02343E-09	HAsO4-2	2.70394E-14	2.70213E-06	66.9920668	98.3452238	
total					5.75444E-09	5.75829E-09	5.34536E-09	5.10795E-09						
100mv														
pH	4	6	8	10						4	6	8	10	
AsO4-3	-24.846	-15.284	-12.124	-10.099	1.42561E-25	5.19996E-16	7.51623E-13	7.96159E-11	AsO4-3	2.4774E-15	9.22737E-06	0.014435909	1.558666801	
H2AsO3-	-13.41	-11.848	-16.688	-22.663	3.89045E-14	1.41906E-12	2.05116E-17	2.1727E-23	H2AsO3-	0.000676077	0.025181294	3.93953E-07	4.25357E-13	
H2AsO4-	-14.056	-8.494	-9.334	-11.309	8.79023E-15	3.20627E-09	4.63447E-10	4.90908E-12	H2AsO4-	0.000152755	56.89551608	8.901109577	0.096106616	
H3AsO3	-8.24	-8.678	-15.518	-23.493	5.7544E-09	2.09894E-09	3.03389E-16	3.21366E-24	H3AsO3	99.99916796	37.24586297	5.82699E-06	6.29149E-14	
H3AsO4	-15.756	-12.194	-15.034	-19.009	1.75388E-16	6.39735E-13	9.24698E-16	9.7949E-20	H3AsO4	3.04787E-06	0.011352148	1.776E-05	1.91758E-09	
HAsO3-2	-23.51	-19.948	-22.788	-26.763	3.0903E-24	1.1272E-20	1.6293E-23	1.72584E-27	HAsO3-2	5.37027E-14	2.00022E-10	3.12928E-13	3.37873E-17	
HAsO4-2	-17.046	-9.484	-8.324	-8.299	8.99498E-18	3.28095E-10	4.74242E-09	5.02343E-09	HAsO4-2	1.56313E-07	5.822078289	91.08443053	98.34522658	
total					5.75445E-09	5.63536E-09	5.20662E-09	5.10795E-09						
300mv														
pH	4	6	8	10						4	6	8	10	
AsO4-3	-19.095	-15.087	-12.124	-10.099	8.03526E-20	8.18465E-16	7.51623E-13	7.96159E-11	AsO4-3	1.42957E-09	1.47099E-05	0.01443591	1.558666801	
H2AsO3-	-14.42	-18.412	-23.45	-29.424	3.80189E-15	3.87258E-19	3.54813E-24	3.76704E-30	H2AsO3-	6.76401E-05	6.96001E-09	6.81466E-14	7.37485E-20	
H2AsO4-	-8.305	-8.297	-9.334	-11.309	4.9545E-09	5.04661E-09	4.63447E-10	4.90908E-12	H2AsO4-	88.14628464	90.70055374	8.90111013	0.096106616	
H3AsO3	-9.25	-15.242	-22.28	-30.254	5.62341E-10	5.72796E-16	5.24807E-23	5.57186E-31	H3AsO3	10.00469864	1.02946E-05	1.00796E-12	1.09082E-20	
H3AsO4	-10.005	-11.997	-15.034	-19.009	9.88553E-11	1.00693E-12	9.24698E-16	9.7949E-20	H3AsO4	1.758749599	0.01809714	1.776E-05	1.91758E-09	
HAsO3-2	-24.52	-26.512	-29.55	-33.524	3.01995E-25	3.0761E-27	2.81838E-30	2.99226E-34	HAsO3-2	5.37284E-15	5.52853E-17	5.41308E-20	5.85805E-24	
HAsO4-2	-11.295	-9.287	-8.324	-8.299	5.06991E-12	5.16416E-10	4.74242E-09	5.02343E-09	HAsO4-2	0.090199475	9.281324104	91.0844362	98.34522658	
total					5.62077E-09	5.56404E-09	5.20662E-09	5.10795E-09						

EMR (AS(III)/AS(V)) 240 Hour Sample

-300mV
log activity

pH	4	6	8	10
AsO4-3	-36.545	-26.546	-16.575	-8.468
H2AsO3-	-11.586	-9.586	-7.615	-7.508
H2AsO4-	-25.755	-19.756	-13.785	-9.678
H3AsO3	-6.416	-6.416	-6.445	-8.338
H3AsO4	-27.455	-23.456	-19.485	-17.378
HAsO3-2	-21.686	-17.686	-13.715	-11.608
HAsO4-2	-28.745	-20.746	-12.775	-6.668

Activity

2.85102E-37	2.84446E-27	2.66073E-17	3.40408E-09 AsO4-3
2.59418E-12	2.59418E-10	2.42661E-08	3.10456E-08 H2AsO3-
1.75792E-26	1.75388E-20	1.64059E-14	2.09894E-10 H2AsO4-
3.83707E-07	3.83707E-07	3.58922E-07	4.59198E-09 H3AsO3
3.50752E-28	3.49945E-24	3.27341E-20	4.18794E-18 H3AsO4
2.06063E-22	2.06063E-18	1.92752E-14	2.46604E-12 HAsO3-2
1.79887E-29	1.79473E-21	1.6788E-13	2.14783E-07 HAsO4-2
total	3.8371E-07	3.83967E-07	2.54037E-07

%species

4	6	8	10
7.43014E-29	7.40809E-19	6.94365E-09	1.339994182
0.000676078	0.06756262	6.332684167	12.22089219
4.58139E-18	4.56779E-12	4.28142E-06	0.082623372
99.99932392	99.93243738	93.6672627	1.807602415
9.14107E-20	9.11395E-16	8.54256E-12	1.64855E-09
5.37028E-14	5.36669E-10	5.03023E-06	0.00097074
4.6881E-21	4.67419E-13	4.38115E-05	84.5479171

-100mV

pH	4	6	8	10
AsO4-3	-29.784	-19.784	-10.501	-8.452
H2AsO3-	-11.586	-9.586	-8.303	-14.254
H2AsO4-	-18.994	-12.994	-7.711	-9.662
H3AsO3	-6.416	-6.416	-7.133	-15.084
H3AsO4	-20.694	-16.694	-13.411	-17.362
HAsO3-2	-21.686	-17.686	-14.403	-18.354
HAsO4-2	-21.984	-13.984	-6.701	-6.652

1.64437E-30	1.64437E-20	3.155E-11	3.53183E-09 AsO4-3
2.59418E-12	2.59418E-10	4.97737E-09	5.57186E-15 H2AsO3-
1.01391E-19	1.01391E-13	1.84536E-08	2.17771E-10 H2AsO4-
3.83707E-07	3.83707E-07	7.36207E-08	8.24138E-16 H3AsO3
2.02302E-21	2.02302E-17	3.8815E-14	4.3451E-18 H3AsO4
2.06063E-22	2.06063E-18	3.95367E-15	4.42588E-19 HAsO3-2
1.03753E-22	1.03753E-14	1.99067E-07	2.22844E-07 HAsO4-2
total	3.8371E-07	3.83967E-07	2.26593E-07

4	6	8	10
4.28546E-22	4.28259E-12	0.010617527	1.558666757
0.000676078	0.0675626	1.675033035	2.45897E-06
2.64239E-11	2.64062E-05	6.546714119	0.096106613
99.99932392	99.93240829	24.77555412	3.63708E-07
5.27226E-13	5.26873E-09	1.30624E-05	1.91758E-09
5.37028E-14	5.36669E-10	1.33053E-06	1.95323E-10
2.70394E-14	2.70213E-06	66.9920668	98.3452238

100mV

pH	4	6	8	10
AsO4-3	-23.022	-13.46	-10.469	-8.452
H2AsO3-	-11.586	-10.024	-15.033	-21.016
H2AsO4-	-12.232	-6.67	-7.679	-9.662
H3AsO3	-6.416	-6.854	-13.863	-21.846
H3AsO4	-13.932	-10.37	-13.379	-17.362
HAsO3-2	-21.686	-18.124	-21.133	-25.116
HAsO4-2	-15.222	-7.66	-6.669	-6.652

9.50605E-24	3.46737E-14	3.39625E-11	3.53183E-09 AsO4-3
2.59418E-12	9.46237E-11	9.2683E-16	9.63829E-22 H2AsO3-
5.86138E-13	2.13796E-07	2.09411E-08	2.17771E-10 H2AsO4-
3.83707E-07	1.39959E-07	1.37088E-14	1.42561E-22 H3AsO3
1.1695E-14	4.2658E-11	4.1783E-14	4.3451E-18 H3AsO4
2.06063E-22	7.51623E-19	7.36207E-22	7.65597E-26 HAsO3-2
5.99791E-16	2.18776E-08	2.14289E-07	2.22844E-07 HAsO4-2
total	3.8371E-07	3.7577E-07	2.35264E-07

4	6	8	10
2.4774E-15	9.22737E-06	0.014435909	1.558666801
0.000676077	0.025181294	3.93953E-07	4.25357E-13
0.000152755	56.89551608	8.901109577	0.096106616
99.99916796	37.24586297	5.82699E-06	6.29149E-14
3.04787E-06	0.011352148	1.776E-05	1.91758E-09
5.37027E-14	2.00022E-10	3.12928E-13	3.37873E-17
1.56313E-07	5.822078289	91.08443053	98.34522658

300mV

pH	4	6	8	10
AsO4-3	-17.271	-13.263	-10.469	-8.452
H2AsO3-	-12.597	-16.589	-21.794	-27.778
H2AsO4-	-6.481	-6.473	-7.679	-9.662
H3AsO3	-7.427	-13.419	-20.624	-28.608
H3AsO4	-8.181	-10.173	-13.379	-17.362
HAsO3-2	-22.697	-24.689	-27.894	-31.878
HAsO4-2	-9.471	-7.463	-6.669	-6.652

5.35797E-18	5.45758E-14	3.39625E-11	3.53183E-09 AsO4-3
2.5293E-13	2.57632E-17	1.60694E-22	1.66725E-28 H2AsO3-
3.3037E-07	3.36512E-07	2.09411E-08	2.17771E-10 H2AsO4-
3.74111E-08	3.81066E-14	2.37684E-21	2.46604E-29 H3AsO3
6.59174E-09	6.71429E-11	4.1783E-14	4.3451E-18 H3AsO4
2.00909E-23	2.04644E-25	1.27644E-28	1.32434E-32 HAsO3-2
3.38065E-10	3.4435E-08	2.14289E-07	2.22844E-07 HAsO4-2
total	3.74711E-07	3.71014E-07	2.26593E-07

4	6	8	10
1.42989E-09	1.47099E-05	0.01443591	1.558666801
6.75E-05	6.944E-09	6.83037E-14	7.35789E-20
88.16657205	90.70055377	8.90111013	0.096106616
9.983985822	1.02709E-05	1.01029E-12	1.08831E-20
1.759154387	0.01809714	1.776E-05	1.91758E-09
5.36172E-15	5.51582E-17	5.42556E-20	5.84458E-24
0.090220235	9.281324106	91.0844362	98.34522658

Precipitate is BaHAsO4:H2O

Det limit = .001 mg/L

pH	-300 mV	-100 mV	100 mV	300 mV
4	0	0	0	0
6	0	0	0	0
8	0	6.31E-08	1.23E-07	1.23E-07
10	9.99E-08	1.27E-07	1.27E-07	1.27E-07

SLC (AS(III)/AS(V)) Time 0 Sample

-300mv					Activity					%species				
log activity														
pH	4	6	8	10						4	6	8	10	
AsO4-3	-36.395	-26.395	-16.424	-8.21	4.02717E-37	4.02717E-27	3.76704E-17	6.16595E-09	AsO4-3	7.41305E-29	7.40809E-19	6.95966E-09	1.340426696	
H2AsO3-	-11.435	-9.435	-7.465	-7.251	3.67282E-12	3.67282E-10	3.42768E-08	5.61048E-08	H2AsO3-	0.000676078	0.06756262	6.33268416	12.19672042	
H2AsO4-	-25.605	-19.605	-13.634	-9.42	2.48313E-26	2.48313E-20	2.32274E-14	3.80189E-10	H2AsO4-	4.57085E-18	4.56779E-12	4.29129E-06	0.08265004	
H3AsO3	-6.265	-6.265	-6.295	-8.081	5.4325E-07	5.4325E-07	5.06991E-07	8.29851E-09	H3AsO3	99.99932392	99.93243738	93.6672626	1.804027148	
H3AsO4	-27.305	-23.305	-19.334	-17.12	4.9545E-28	4.9545E-24	4.63447E-20	7.58578E-18	H3AsO4	9.12005E-20	9.11395E-16	8.56225E-12	1.64909E-09	
HAsO3-2	-21.535	-17.535	-13.565	-11.351	2.91743E-22	2.91743E-18	2.7227E-14	4.45656E-12	HAsO3-2	5.37028E-14	5.36669E-10	5.03023E-06	0.00096882	
HAsO4-2	-28.595	-20.595	-12.624	-6.41	2.54097E-29	2.54097E-21	2.37684E-13	3.89045E-07	HAsO4-2	4.67732E-21	4.67419E-13	4.39125E-05	84.57520687	
total					5.43254E-07	5.43618E-07	5.41268E-07	4.59999E-07						
-100mv														
log activity														
pH	4	6	8	10						4	6	8	10	
AsO4-3	-29.633	-19.633	-10.291	-8.153	2.32809E-30	2.32809E-20	5.11682E-11	7.03072E-09	AsO4-3	4.28546E-22	4.28259E-12	0.010617527	1.558666757	
H2AsO3-	-11.435	-9.435	-8.093	-13.955	3.67282E-12	3.67282E-10	8.07235E-09	1.10917E-14	H2AsO3-	0.000676078	0.0675626	1.675033035	2.45897E-06	
H2AsO4-	-18.843	-12.843	-7.501	-9.363	1.43549E-19	1.43549E-13	3.155E-08	4.33511E-10	H2AsO4-	2.64239E-11	2.64062E-05	6.546714119	0.096106613	
H3AsO3	-6.265	-6.265	-6.923	-14.785	5.4325E-07	5.4325E-07	1.19399E-07	1.64059E-15	H3AsO3	99.99932392	99.93240829	24.77555412	3.63708E-07	
H3AsO4	-20.543	-16.543	-13.201	-17.063	2.86418E-21	2.86418E-17	6.29506E-14	8.64968E-18	H3AsO4	5.27226E-13	5.26873E-09	1.30624E-05	1.91758E-09	
HAsO3-2	-21.535	-17.535	-14.193	-18.055	2.91743E-22	2.91743E-18	6.4121E-15	8.81049E-19	HAsO3-2	5.37028E-14	5.36669E-10	1.33053E-06	1.95323E-10	
HAsO4-2	-21.833	-13.833	-6.491	-6.353	1.46893E-22	1.46893E-14	3.22849E-07	4.43609E-07	HAsO4-2	2.70394E-14	2.70213E-06	66.9920668	98.3452238	
total					5.43254E-07	5.43618E-07	4.81922E-07	4.51073E-07						
100mv														
log activity														
pH	4	6	8	10						4	6	8	10	
AsO4-3	-22.871	-13.315	-10.175	-8.153	1.34586E-23	4.84172E-14	6.68344E-11	7.03072E-09	AsO4-3	2.4774E-15	9.22737E-06	0.014435909	1.558666801	
H2AsO3-	-11.435	-9.879	-14.739	-20.717	3.67282E-12	1.3213E-10	1.8239E-15	1.91867E-21	H2AsO3-	0.000676077	0.025181294	3.93953E-07	4.25357E-13	
H2AsO4-	-12.081	-6.525	-7.385	-9.363	8.29851E-13	2.98538E-07	4.12098E-08	4.33511E-10	H2AsO4-	0.000152755	56.89551608	8.901109577	0.096106616	
H3AsO3	-6.265	-6.709	-13.569	-21.547	5.4325E-07	1.95434E-07	2.69774E-14	2.83792E-22	H3AsO3	99.99916796	37.24586297	5.82699E-06	6.29149E-14	
H3AsO4	-13.781	-10.225	-13.085	-17.063	1.65577E-14	5.95662E-11	8.22243E-14	8.64968E-18	H3AsO4	3.04787E-06	0.011352148	1.776E-05	1.91758E-09	
HAsO3-2	-21.535	-17.979	-20.839	-24.817	2.91743E-22	1.04954E-18	1.44877E-21	1.52405E-25	HAsO3-2	5.37027E-14	2.00022E-10	3.12928E-13	3.37873E-17	
HAsO4-2	-15.071	-7.515	-6.375	-6.353	8.4918E-16	3.05492E-08	4.21697E-07	4.43609E-07	HAsO4-2	1.56313E-07	5.822078289	91.08443053	98.34522658	
total					5.43255E-07	5.24713E-07	4.62973E-07	4.51073E-07						
300 mV														
log activity														
pH	4	6	8	10						4	6	8	10	
AsO4-3	-17.126	-13.121	-10.175	-8.153	7.4817E-18	7.56833E-14	6.68344E-11	7.03072E-09	AsO4-3	1.42957E-09	1.47099E-05	0.01443591	1.558666801	
H2AsO3-	-12.451	-16.446	-21.501	-27.479	3.53997E-13	3.58096E-17	3.155E-22	3.31894E-28	H2AsO3-	6.76401E-05	6.96001E-09	6.81466E-14	7.35789E-20	
H2AsO4-	-6.336	-6.331	-7.385	-9.363	4.61318E-07	4.66659E-07	4.12098E-08	4.33511E-10	H2AsO4-	88.14628464	90.70055374	8.90111013	0.096106616	
H3AsO3	-7.281	-13.276	-20.331	-28.309	5.236E-08	5.29663E-14	4.66659E-21	4.90908E-29	H3AsO3	10.00469864	1.02946E-05	1.00796E-12	1.08831E-20	
H3AsO4	-8.036	-10.031	-13.085	-17.063	9.2045E-09	9.31108E-11	8.22243E-14	8.64968E-18	H3AsO4	1.758749599	0.01809714	1.776E-05	1.91758E-09	
HAsO3-2	-22.551	-24.546	-27.601	-31.579	2.8119E-23	2.84446E-25	2.50611E-28	2.63633E-32	HAsO3-2	5.37284E-15	5.52853E-17	5.41308E-20	5.84458E-24	
HAsO4-2	-9.326	-7.321	-6.375	-6.353	4.72063E-10	4.77529E-08	4.21697E-07	4.43609E-07	HAsO4-2	0.090199475	9.281324104	91.0844362	98.34522658	
total					5.23355E-07	5.14506E-07	4.62973E-07	4.51073E-07						

Precipitate - Barite

pH	-300 mV	-100 mV	100 mV	300 mV
4	3.92E-07	3.92E-07	3.92E-07	3.92E-07
6	3.95E-07	3.95E-07	3.95E-07	3.95E-07
8	3.90E-07	3.89E-07	3.89E-07	3.89E-07
10	3.67E-07	3.67E-07	3.67E-07	3.67E-07

SLC (AS(III)/AS(V)) 240 Hour Sample

-300mV

log activity

pH	4	6	8	10									
AsO4-3	-36.395	-26.395	-16.424	-8.21	4.02717E-37	4.02717E-27	3.76704E-17	6.16595E-09 AsO4-3	7.41305E-29	7.40809E-19	6.95966E-09	1.340426696	
H2AsO3-	-11.435	-9.435	-7.465	-7.251	3.67282E-12	3.67282E-10	3.42768E-08	5.61048E-08 H2AsO3-	0.000676078	0.06756262	6.33268416	12.19672042	
H2AsO4-	-25.605	-19.605	-13.634	-9.42	2.48313E-26	2.48313E-20	2.32274E-14	3.80189E-10 H2AsO4-	4.57085E-18	4.56779E-12	4.29129E-06	0.08265004	
H3AsO3	-6.265	-6.265	-6.295	-8.081	5.4325E-07	5.4325E-07	5.06991E-07	8.29851E-09 H3AsO3	99.99932392	99.93243738	93.6672626	1.804027148	
H3AsO4	-27.305	-23.305	-19.334	-17.12	4.9545E-28	4.9545E-24	4.63447E-20	7.58578E-18 H3AsO4	9.12005E-20	9.11395E-16	8.56225E-12	1.64909E-09	
HAsO3-2	-21.535	-17.535	-13.565	-11.351	2.91743E-22	2.91743E-18	2.7227E-14	4.45656E-12 HAsO3-2	5.37028E-14	5.36669E-10	5.03023E-06	0.00096882	
HAsO4-2	-28.595	-20.595	-12.624	-6.41	2.54097E-29	2.54097E-21	2.37684E-13	3.89045E-07 HAsO4-2	4.67732E-21	4.67419E-13	4.39125E-05	84.57520687	
total					5.43254E-07	5.43618E-07	5.41268E-07	4.59999E-07					

-100mV

pH	4	6	8	10									
AsO4-3	-29.633	-19.633	-10.291	-8.153	2.32809E-30	2.32809E-20	5.11682E-11	7.03072E-09	AsO4-3	4.28546E-22	4.28259E-12	0.010617527	1.558666757
H2AsO3-	-11.435	-9.435	-8.093	-13.955	3.67282E-12	3.67282E-10	8.07235E-09	1.10917E-14	H2AsO3-	0.000676078	0.0675626	1.675033035	2.45897E-06
H2AsO4-	-18.843	-12.843	-7.501	-9.363	1.43549E-19	1.43549E-13	3.155E-08	4.33511E-10	H2AsO4-	2.64239E-11	2.64062E-05	6.546714119	0.096106613
H3AsO3	-6.265	-6.265	-6.923	-14.785	5.4325E-07	5.4325E-07	1.19399E-07	1.64059E-15	H3AsO3	99.99932392	99.93240829	24.77555412	3.63708E-07
H3AsO4	-20.543	-16.543	-13.201	-17.063	2.86418E-21	2.86418E-17	6.29506E-14	8.64968E-18	H3AsO4	5.27226E-13	5.26873E-09	1.30624E-05	1.91758E-09
HAsO3-2	-21.535	-17.535	-14.193	-18.055	2.91743E-22	2.91743E-18	6.4121E-15	8.81049E-19	HAsO3-2	5.37028E-14	5.36669E-10	1.33053E-06	1.95323E-10
HAsO4-2	-21.833	-13.833	-6.491	-6.353	1.46893E-22	1.46893E-14	3.22849E-07	4.43609E-07	HAsO4-2	2.70394E-14	2.70213E-06	66.9920668	98.3452238
total					5.43254E-07	5.43618E-07	4.81922E-07	4.51073E-07					

100mV

pH	4	6	8	10									
AsO4-3	-22.871	-13.315	-10.175	-8.153	1.34586E-23	4.84172E-14	6.68344E-11	7.03072E-09 AsO4-3	2.4774E-15	9.22737E-06	0.014435909	1.558666801	
H2AsO3-	-11.435	-9.879	-14.739	-20.717	3.67282E-12	1.3213E-10	1.8239E-15	1.91867E-21 H2AsO3-	0.000676077	0.025181294	3.93953E-07	4.25357E-13	
H2AsO4-	-12.081	-6.525	-7.385	-9.363	8.29851E-13	2.98538E-07	4.12098E-08	4.33511E-10 H2AsO4-	0.000152755	56.89551608	8.901109577	0.096106616	
H3AsO3	-6.265	-6.709	-13.569	-21.547	5.4325E-07	1.95434E-07	2.69774E-14	2.83792E-22 H3AsO3	99.99916796	37.24586297	5.82699E-06	6.29149E-14	
H3AsO4	-13.781	-10.225	-13.085	-17.063	1.65577E-14	5.95662E-11	8.22243E-14	8.64968E-18 H3AsO4	3.04787E-06	0.011352148	1.776E-05	1.91758E-09	
HAsO3-2	-21.535	-17.979	-20.839	-24.817	2.91743E-22	1.04954E-18	1.44877E-21	1.52405E-25 HAsO3-2	5.37027E-14	2.00022E-10	3.12928E-13	3.37873E-17	
HAsO4-2	-15.071	-7.515	-6.375	-6.353	8.4918E-16	3.05492E-08	4.21697E-07	4.43609E-07 HAsO4-2	1.56313E-07	5.822078289	91.08443053	98.34522658	
total					5.43255E-07	5.24713E-07	4.62973E-07	4.51073E-07					

300mv

pH	4	6	8	10									
AsO4-3	-17.126	-13.121	-10.175	-8.153	7.4817E-18	7.56833E-14	6.68344E-11	7.03072E-09	AsO4-3	1.42957E-09	1.47099E-05	0.01443591	1.558666801
H2AsO3-	-12.451	-16.446	-21.501	-27.479	3.53997E-13	3.58096E-17	3.155E-22	3.31894E-28	H2AsO3-	6.76401E-05	6.96001E-09	6.81466E-14	7.35789E-20
H2AsO4-	-6.336	-6.331	-7.385	-9.363	4.61318E-07	4.66659E-07	4.12098E-08	4.33511E-10	H2AsO4-	88.14628464	90.70055374	8.90111013	0.096106616
H3AsO3	-7.281	-13.276	-20.331	-28.309	5.238E-08	5.29663E-14	4.66659E-21	4.90908E-29	H3AsO3	1.02946E-05	1.00796E-12	1.08831E-20	
H3AsO4	-8.036	-10.031	-13.085	-17.063	9.2045E-09	9.31108E-11	8.22243E-14	8.64968E-18	H3AsO4	1.758749599	0.01809714	1.776E-05	1.91758E-09
HAsO3-2	-22.551	-24.546	-27.601	-31.579	2.8119E-23	2.84446E-25	2.50611E-28	2.63633E-32	HAsO3-2	5.37284E-15	5.52853E-17	5.41308E-20	5.84458E-24
HAsO4-2	-9.326	-7.321	-6.375	-6.353	4.72063E-10	4.77529E-08	4.21697E-07	4.43609E-07	HAsO4-2	0.090199475	9.281324104	91.0844362	98.34522658
					total	5.23355E-07	5.14506E-07	4.62973E-07	4.51073E-07				

Precipitate - Barite

pH	-300 mV	Log Act	-100 mV	100 mV	300 mV
4	3.92E-07	1.00E+00	3.92E-07	3.92E-07	3.92E-07
6	3.95E-07	1.00E+00	3.95E-07	3.95E-07	3.95E-07
8	3.90E-07	1.00E+00	3.89E-07	3.89E-07	3.89E-07
10	3.67E-07	1.00E+00	3.67E-07	3.67E-07	3.67E-07

EMR (Se) 240 Hour Sample

log activity -300mv					Activity					% Species				
pH	4	6	8	10						4	6	8	10	
H2SeO3 (ε	-8.796	-10.78	-12.934	-16.429	H2SeO3 (ε	1.59956E-09	1.65959E-11	1.16413E-13	3.72392E-17	H2SeO3 (aq)	4.091113783	0.042470756	0.000305111	1.04526E-07
HSeO3-1	-7.426	-7.41	-7.564	-9.059	HSeO3-1	3.74973E-08	3.89045E-08	2.72898E-08	8.72971E-10	HSeO3-1	95.90506817	99.56116909	71.52505687	2.450336752
HSeO4-1	-44.176	-40.16	-36.315	-33.809	HSeO4-1	6.66807E-45	6.91831E-41	4.84172E-37	1.55239E-34	HSeO4-1	1.70546E-35	1.77048E-31	1.26899E-27	4.35738E-25
SeO3-2	-11.826	-9.81	-7.964	-7.459	SeO3-2	1.49279E-12	1.54882E-10	1.08643E-08	3.47536E-08	SeO3-2	0.00381805	0.396360153	28.47463802	97.54966314
SeO4-2	-41.876	-35.86	-30.015	-25.509	SeO4-2	1.33045E-42	1.38038E-36	9.66051E-31	3.09742E-26	SeO4-2	3.40284E-33	3.53256E-27	2.53197E-21	8.69412E-17
					total	3.90984E-08	3.9076E-08	3.81542E-08	3.56266E-08					

log activity -100mv					Activity					% Species				
pH	4	6	8	10						4	6	8	10	
H2SeO3 (ε	-8.796	-10.78	-12.934	-16.429	H2SeO3 (ε	1.59956E-09	1.65959E-11	1.16413E-13	3.72392E-17	H2SeO3 (aq)	4.091113783	0.042470756	0.000305111	1.04526E-07
HSeO3-1	-7.426	-7.41	-7.564	-9.059	HSeO3-1	3.74973E-08	3.89045E-08	2.72898E-08	8.72971E-10	HSeO3-1	95.90506817	99.56116909	71.52505687	2.450336752
HSeO4-1	-37.414	-33.399	-29.553	-27.048	HSeO4-1	3.85478E-38	3.99025E-34	2.79898E-30	8.95365E-28	HSeO4-1	9.8592E-29	1.02115E-24	7.33598E-21	2.51319E-18
SeO3-2	-11.826	-9.81	-7.964	-7.459	SeO3-2	1.49279E-12	1.54882E-10	1.08643E-08	3.47536E-08	SeO3-2	0.00381805	0.396360153	28.47463802	97.54966314
SeO4-2	-35.114	-29.099	-23.253	-18.748	SeO4-2	7.6913E-36	7.96159E-30	5.5847E-24	1.78649E-19	SeO4-2	1.96717E-26	2.03746E-20	1.46372E-14	5.01448E-10
					total	3.90984E-08	3.9076E-08	3.81542E-08	3.56266E-08					

log activity					Activity					% Species				
pH	4	6	8	10						4	6	8	10	
H2SeO3 (ε	-8.796	-10.78	-12.934	-16.429	H2SeO3 (ε	1.59956E-09	1.65959E-11	1.16413E-13	3.72392E-17	H2SeO3 (aq)	4.091113783	0.042470756	0.000305111	1.04523E-07
HSeO3-1	-7.426	-7.41	-7.564	-9.059	HSeO3-1	3.74973E-08	3.89045E-08	2.72898E-08	8.72971E-10	HSeO3-1	95.90506817	99.56116909	71.52505681	2.450265723
HSeO4-1	-30.653	-26.637	-22.791	-20.286	HSeO4-1	2.22331E-31	2.30675E-27	1.61808E-23	5.17607E-21	HSeO4-1	5.68645E-22	5.90323E-18	4.2409E-14	1.45282E-11
SeO3-2	-11.826	-9.81	-7.964	-7.459	SeO3-2	1.49279E-12	1.54882E-10	1.08643E-08	3.47536E-08	SeO3-2	0.00381805	0.396360153	28.47463799	97.54683541
SeO4-2	-28.353	-22.337	-16.491	-11.986	SeO4-2	4.43609E-29	4.60257E-23	3.22849E-17	1.03276E-12	SeO4-2	1.1346E-19	1.17785E-13	8.46171E-08	0.002898766
					total	3.90984E-08	3.9076E-08	3.81542E-08	3.56276E-08					

log activity 300mv					Activity					% Species				
pH	4	6	8	10						4	6	8	10	
H2SeO3 (ε	-8.796	-10.78	-12.936	-18.656	H2SeO3 (ε	1.59956E-09	1.65959E-11	1.15878E-13	2.208E-19	H2SeO3 (aq)	4.091113783	0.042470755	0.000303629	6.20035E-10
HSeO3-1	-7.426	-7.41	-7.566	-11.286	HSeO3-1	3.74973E-08	3.89045E-08	2.71644E-08	5.17607E-12	HSeO3-1	95.90506817	99.56116841	71.17767892	0.014535037
HSeO4-1	-23.891	-19.875	-16.032	-15.751	HSeO4-1	1.28529E-24	1.33352E-20	9.28966E-17	1.77419E-16	HSeO4-1	3.28732E-15	3.41264E-11	2.43413E-07	4.98214E-07
SeO3-2	-11.826	-9.81	-7.966	-9.686	SeO3-2	1.49279E-12	1.54882E-10	1.08143E-08	2.06063E-10	SeO3-2	0.00381805	0.396360151	28.33634436	0.578650264
SeO4-2	-21.591	-15.575	-9.732	-7.451	SeO4-2	2.56448E-22	2.66073E-16	1.85353E-10	3.53997E-08	SeO4-2	6.55906E-13	6.8091E-07	0.485672845	99.4068142
					total	3.90984E-08	3.9076E-08	3.81642E-08	3.5611E-08					

SLC (Se) Time 0 Sample

log activity -300mv										%species									
pH	4	6	8	10	Activity					4	6	8	10						
H2SeO3 (aq)	-8.774	-10.758	-12.919	-16.426	H2SeO3 (ε)	1.68267E-09	1.74582E-11	1.20504E-13	3.74973E-17	H2SeO3 (aq)	4.091113783	0.042470756	0.000305111	1.04526E-07					
HSeO3-1	-7.404	-7.388	-7.549	-9.056	HSeO3-1	3.94457E-08	4.09261E-08	2.82488E-08	8.79023E-10	HSeO3-1	95.90506817	99.56116909	71.52505687	2.450336752					
HSeO4-1	-44.154	-40.139	-36.299	-33.806	HSeO4-1	7.01455E-45	7.26106E-41	5.02343E-37	1.56315E-34	HSeO4-1	1.70546E-35	1.7664E-31	1.27192E-27	4.35738E-25					
SeO3-2	-11.804	-9.788	-7.949	-7.456	SeO3-2	1.57036E-12	1.6293E-10	1.1246E-08	3.49945E-08	SeO3-2	0.00381805	0.396360153	28.47463802	97.54966314					
SeO4-2	-41.854	-35.839	-29.999	-25.506	SeO4-2	1.39959E-42	1.44877E-36	1.00231E-30	3.11889E-26	SeO4-2	3.40284E-33	3.52444E-27	2.5378E-21	8.69412E-17					
					total	4.113E-08	4.11065E-08	3.9495E-08	3.58735E-08										
log activity -100mv																			
pH	4	6	8	10						4	6	8	10						
H2SeO3 (aq)	-8.774	-10.758	-12.919	-16.426	H2SeO3 (ε)	1.68267E-09	1.74582E-11	1.20504E-13	3.74973E-17	H2SeO3 (aq)	4.091113783	0.042470756	0.000305111	1.04526E-07					
HSeO3-1	-7.404	-7.388	-7.549	-9.056	HSeO3-1	3.94457E-08	4.09261E-08	2.82488E-08	8.79023E-10	HSeO3-1	95.90506817	99.56116909	71.52505687	2.450336752					
HSeO4-1	-37.392	-33.377	-29.538	-27.045	HSeO4-1	4.05509E-38	4.19759E-34	2.89734E-30	9.01571E-28	HSeO4-1	9.8592E-29	1.02115E-24	7.33598E-21	2.51319E-18					
SeO3-2	-11.804	-9.788	-7.949	-7.456	SeO3-2	1.57036E-12	1.6293E-10	1.1246E-08	3.49945E-08	SeO3-2	0.00381805	0.396360153	28.47463802	97.54966314					
SeO4-2	-35.092	-29.077	-23.238	-18.745	SeO4-2	8.09096E-36	8.37529E-30	5.78096E-24	1.79887E-19	SeO4-2	1.96717E-26	2.03746E-20	1.46372E-14	5.01448E-10					
					total	4.113E-08	4.11065E-08	3.9495E-08	3.58735E-08										
log activity 100mv																			
pH	4	6	8	10						4	6	8	10						
H2SeO3 (aq)	-8.774	-10.758	-12.919	-16.426	H2SeO3 (ε)	1.68267E-09	1.74582E-11	1.20504E-13	3.74973E-17	H2SeO3 (aq)	4.091113783	0.042470756	0.000305111	1.04523E-07					
HSeO3-1	-7.404	-7.388	-7.549	-9.056	HSeO3-1	3.94457E-08	4.09261E-08	2.82488E-08	8.79023E-10	HSeO3-1	95.90506817	99.56116909	71.52505681	2.450265723					
HSeO4-1	-30.631	-26.615	-22.776	-20.283	HSeO4-1	2.33884E-31	2.42661E-27	1.67494E-23	5.21195E-21	HSeO4-1	5.68645E-22	5.90323E-18	4.2409E-14	1.45282E-11					
SeO3-2	-11.804	-9.788	-7.949	-7.456	SeO3-2	1.57036E-12	1.6293E-10	1.1246E-08	3.49945E-08	SeO3-2	0.00381805	0.396360153	28.47463799	97.54683541					
SeO4-2	-28.331	-22.315	-16.476	-11.983	SeO4-2	4.66659E-29	4.84172E-23	3.34195E-17	1.03992E-12	SeO4-2	1.1346E-19	1.17785E-13	8.46171E-08	0.002898766					
					total	4.113E-08	4.11065E-08	3.9495E-08	3.58746E-08										
log activity 300mv																			
pH	4	6	8	10						4	6	8	10						
H2SeO3 (aq)	-8.774	-10.758	-12.921	-18.654	H2SeO3 (ε)	1.68267E-09	1.74582E-11	1.1995E-13	2.2182E-19	H2SeO3 (aq)	4.091113783	0.042470755	0.000303626	6.20035E-10					
HSeO3-1	-7.404	-7.388	-7.551	-11.284	HSeO3-1	3.94457E-08	4.09261E-08	2.8119E-08	5.19996E-12	HSeO3-1	95.90506817	99.56116841	71.17688203	0.014535037					
HSeO4-1	-23.869	-19.854	-16.016	-15.749	HSeO4-1	1.35207E-24	1.39959E-20	9.63829E-17	1.78238E-16	HSeO4-1	3.28732E-15	3.40479E-11	2.43971E-07	4.98214E-07					
SeO3-2	-11.804	-9.788	-7.951	-9.684	SeO3-2	1.57036E-12	1.6293E-10	1.11944E-08	2.07014E-10	SeO3-2	0.00381805	0.396360151	28.33602711	0.578650264					
SeO4-2	-21.569	-15.554	-9.716	-7.449	SeO4-2	2.69774E-22	2.79254E-16	1.92309E-10	3.55631E-08	SeO4-2	6.55906E-13	6.79344E-07	0.486786986	99.4068142					
					total	4.113E-08	4.11065E-08	3.95058E-08	3.57753E-08										

SLC (Se) - 240 Hour Sample

log activity
-300mv

Activity							%species								
pH		4	6	8	10				4	6	8	10			
H2SeO3 (ε		-8.425	-10.41	-12.571	-16.078	H2SeO3 (ε	3.75837E-09	3.89045E-11	2.68534E-13	8.35603E-17	H2SeO3 (aq)	4.091113783	0.042470756	0.000305111	1.04526E-07
HSeO3-1		-7.055	-7.04	-7.201	-8.708	HSeO3-1	8.81049E-08	9.12011E-08	6.29506E-08	1.95884E-09	HSeO3-1	95.90506817	99.56116909	71.52505687	2.450336752
HSeO4-1		-43.806	-39.791	-35.951	-33.459	HSeO4-1	1.56315E-44	1.61808E-40	1.11944E-36	3.47536E-34	HSeO4-1	1.70154E-35	1.7664E-31	1.27192E-27	4.34736E-25
SeO3-2		-11.455	-9.44	-7.601	-7.108	SeO3-2	3.50752E-12	3.63078E-10	2.50611E-08	7.7983E-08	SeO3-2	0.00381805	0.396360153	28.47463802	97.54966314
SeO4-2		-41.506	-35.491	-29.651	-25.159	SeO4-2	3.11889E-42	3.22849E-36	2.23357E-30	6.93426E-26	SeO4-2	3.39501E-33	3.52444E-27	2.5378E-21	8.67413E-17
						total	9.18668E-08	9.16031E-08	8.8012E-08	7.99419E-08					

pH
-100mv

pH				Activity				%species						
	4	6	8	10					4	6	8	10		
H2SeO3 (ε	-8.425	-10.41	-12.571	-16.078	H2SeO3 (ε	3.75837E-09	3.89045E-11	2.68534E-13	8.35603E-17	H2SeO3 (aq)	4.091113783	0.042470756	0.000305111	1.04526E-07
HSeO3-1	-7.055	-7.04	-7.201	-8.708	HSeO3-1	8.81049E-08	9.12011E-08	6.29506E-08	1.95884E-09	HSeO3-1	95.90506817	99.56116909	71.52505687	2.450336752
HSeO4-1	-37.044	-33.029	-29.189	-26.697	HSeO4-1	9.03649E-38	9.35406E-34	6.47143E-30	2.00909E-27	HSeO4-1	9.83652E-29	1.02115E-24	7.35289E-21	2.51319E-18
SeO3-2	-11.455	-9.44	-7.601	-7.108	SeO3-2	3.50752E-12	3.63078E-10	2.50611E-08	7.7983E-08	SeO3-2	0.00381805	0.396360153	28.47463802	97.54966314
SeO4-2	-34.744	-28.729	-22.889	-18.397	SeO4-2	1.80302E-35	1.86638E-29	1.29122E-23	4.00867E-19	SeO4-2	1.96264E-26	2.03746E-20	1.46709E-14	5.01448E-10
					total	9.18668E-08	9.16031E-08	8.8012E-08	7.99419E-08					

100mv

pH	4				6				8				10			
H2SeO3 (ε	-8.425	-10.41	-12.571	-16.078	H2SeO3 (ε	3.75837E-09	3.89045E-11	2.68534E-13	8.35603E-17	H2SeO3 (aq)	4.091113783	0.042470756	0.000305111	1.04523E-07		
HSeO3-1	-7.055	-7.04	-7.201	-8.708	HSeO3-1	8.81049E-08	9.12011E-08	6.29506E-08	1.95884E-09	HSeO3-1	95.90506817	99.56116909	71.52505681	2.450265723		
HSeO4-1	-30.282	-26.267	-22.428	-19.935	HSeO4-1	5.22396E-31	5.40754E-27	3.7325E-23	1.16145E-20	HSeO4-1	5.68645E-22	5.90323E-18	4.2409E-14	1.45282E-11		
SeO3-2	-11.455	-9.44	-7.601	-7.108	SeO3-2	3.50752E-12	3.63078E-10	2.50611E-08	7.7983E-08	SeO3-2	0.00381805	0.396360153	28.47463799	97.54683541		
SeO4-2	-27.982	-21.967	-16.128	-11.635	SeO4-2	1.04232E-28	1.07895E-22	7.44732E-17	2.31739E-12	SeO4-2	1.1346E-19	1.17785E-13	8.46171E-08	0.002898766		
total					9.18668E-08	9.16031E-08	8.8012E-08	7.99442E-08								

pH

300mv														
	4	6	8	10					4	6	8	10		
H2SeO3 (ε	-8.425	-10.41	-12.573	-18.306	H2SeO3 (ε	3.75837E-09	3.89045E-11	2.67301E-13	4.94311E-19	H2SeO3 (aq)	4.091113783	0.042470755	0.000303626	6.20035E-10
HSeO3-1	-7.055	-7.04	-7.203	-10.936	HSeO3-1	8.81049E-08	9.12011E-08	6.26614E-08	1.15878E-11	HSeO3-1	95.90506817	99.56116841	71.17688203	0.014535037
HSeO4-1	-23.521	-19.505	-15.668	-15.401	HSeO4-1	3.01301E-24	3.12608E-20	2.14783E-16	3.97192E-16	HSeO4-1	3.27976E-15	3.41264E-11	2.43971E-07	4.98214E-07
SeO3-2	-11.455	-9.44	-7.603	-9.336	SeO3-2	3.50752E-12	3.63078E-10	2.49459E-08	4.61318E-10	SeO3-2	0.00381805	0.396360151	28.33602711	0.578650264
SeO4-2	-21.221	-15.205	-9.368	-7.101	SeO4-2	6.01174E-22	6.23735E-16	4.28549E-10	7.92501E-08	SeO4-2	6.54397E-13	6.8091E-07	0.486786986	99.4068142
					total	9.18668E-08	9.16031E-08	8.80361E-08	7.9723E-08					

Appendix F: Elutriate Bioassay Laboratory Data Sheets

TEST ORGANISM RECEIPT AND ACCLIMATION SHEET

(Note: acclimate for 24h - before test initiation)

Project: <u>IVA Fly As</u>	Test Initiation Date: <u>6/23/09</u> Time: <u>1100</u>
Laboratory: <u>ERDC</u>	Test Date(s): _____ Time: _____
Test Species: <u>Larval Pimephales</u>	Page _____ of _____
Exposure duration: <u>4 day</u> <u>MA 6/23/09</u>	Environmental chamber temperature: _____

Day	Date	Original Number	Number Dead/removed	Estimated Survival	Water Change (Y/N)	Feeding (Y/N)	Temp. (°C)	Salinity/Cond. (ppt / uS/cm)	pH (SU)	D.O. (mg/L)	Comments (mg/L)
0*	6/23/09	800	MA 8	MA 800 100%	Y	Y	26.6	610	7.38	11.22	
1	6/24/09	MA 800 792	38	94%	N	Y	22.2	430	7.82	7.55	NC Wasting
2	6/25/09	800	17	92%	Y	Y	20.2	240	7.67	7.80	Ammonia = 1/less than 1
3	6/26/09	800	9	91%	N	Y	19.9	3340	8.37	9.28	Ammonia = 1/less than 1
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											

* Taken immediately upon receiving

TEST ORGANISM RECEIPT AND ACCLIMATION SHEET

(Note: acclimate for 24h - fore test intitation)

Project: <u>TVA Fly Ash</u>	Test Initiation Date: <u>6/23/09</u> Time: <u>1100</u>
Laboratory: <u>ERDC</u>	Test Date(s): _____ Time: _____
Test Species: <u>Juvenile Temephilus pro</u>	Page _____ of _____
Exposure duration: _____	Environmental chamber temperature: _____

Day	Date	Original Number	Number Dead/removed	Estimated Survival	Water Change (Y/N)	Feeding (Y/N)	Temp. (°C)	Salinity/Cond. (ppt / uS/cm)	pH (SU)	D.O. (mg/L)	Comments (mg/L)
0*	6/23/09	250	0	100%	N	Y	26.9	650	6.46	7.02	
1	6/24	250	0	100%	N	Y	20.7	230	7.54	8.21	
2	6/25	250	0	100%	N	Y	21.0	370	7.9	8.72	D.O. = 9.50 Temp(°C) = 21.0A
3	6/26	250	0	100%	N	Y	19.5	230	7.0	8.81	Ammonia = ≤1
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											

* Taken immediately upon receiving

300mL

ELUTRIATE TOXICITY WATER QUALITY SHEET									
Project: TVAE Fly Ash; EMR-EL-LF				Test Initiation Date: 6-26-09		Time: 1400			
Laboratory: EPC				Test Termination Date: 7-6-09		Time: 0900			
Test Species: Larval Pimephales Lurme				Page 1 of 1		PAYO			
Exposure duration: 10-d				Environmental chamber temperature: 20					
Conc.	Repl.	Temperature [17 - 23 °C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Comments
Control	A	19.8	8.17	7.61	260			21	
	B	19.7	8.17	8.02	270				
	C	19.9	8.22	7.43	270				
	D	19.9	8.20	7.55	270				
	E	19.4	8.22	7.37	270				
0%	A	19.5	7.69	6.69	90	64	20	21	
	B	19.2	7.61	8.13	90				
	C	19.2	7.65	8.52	90				
	D	19.2	7.64	8.59	90				
	E	19.4	7.59	8.10	90				
10%	A	19.6	7.12	8.32	90			21	
	B	19.5	7.21	8.21	90				
	C	19.4	7.30	8.19	90				
	D	19.5	7.35	7.41	100				
	E	19.5	7.40	7.61	90				
50%	A	19.7	7.20	7.36	100			21	
	B	19.6	7.35	7.46	110				
	C	19.6	7.39	7.55	120				
	D	19.6	7.59	7.27	110				
	E	19.7	7.00	7.65	110				
100%	A	19.8	7.30	7.59	120	100	22	21	
	B	19.7	7.57	7.62	120				
	C	19.7	7.63	7.26	140				
	D	19.7	7.64	7.27	120				
	E	19.6	7.68	7.22	120				
Initials:		MA	MA	NC	NC	MA	MA	NC	
Date:		6/26/09	6/26/09	6/26/09	6/26/09	6/26/09	6/26/09	6/26/09	
Time:		1:00	1:00	2:30	1:00	4:00	4:20	4:00	
Initials (QA):		NC	NC	MA	NC	MA	MA	NC	

Reviewed by

AK

Date

7-14-09

Comment

300 mL

ELUTRIATE TOXICITY WATER QUALITY SHEET									
Project: <u>TVIA ELA ASH ; SLC-EL-LF</u>				Test Initiation Date: <u>6-26-09</u>		Time: <u>1400</u>		<u>Page 0</u>	
Laboratory: <u>ERDC</u>				Test Termination Date: <u>7-6-09</u>		Time: <u>0900</u>			
Test Species: <u>Larval Pimephyla</u>				Page 1 of 1					
Exposure duration: <u>10-2</u>				Environmental chamber temperature: <u>20</u>					
Conc.	Repl.	Temperature [17 - 23 ° C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Comments
Control	A								
	B								
	C								
	D								
	E								
0%	A								
	B								
	C								
	D								
	E								
10%	A	20.4	7.52	6.75	110				
	B	20.3	7.65	6.40	110				
	C	20.4	7.66	6.5	110				
	D	20.5	7.60	6.8	110				
	E	20.6	7.58	6.6	110				
50%	A	19.7	7.56	7.07	180				
	B	19.5	7.80	6.73	180				
	C	19.5	7.86	7.32	180				
	D	19.5	7.83	7.51	180				
	E	19.5	7.84	6.80	180				
100%	A	19.6	8.05	7.49	260	160	76		
	B	19.4	8.03	8.61	260				
	C	19.4	8.09	7.81	260				
	D	19.4	7.98	7.71	260				
	E	19.4	8.00	8.15	260				
Initials:		MA	MA	NC	NC	MA	MA	NC	
Date		6/26/09	6/26/09	6/26/09	6/26/09	6/26/09	6/26/09	6/26/09	
Time		6:00	1:00	3:00	1:00	4:00	4:00	4:00	
Initials (QA):		NC	NC	MA	NC	MA	MA	NC	

Reviewed by

AK

Date

7-14-09

Comment

4-L JAR

ELUTRIATE TOXICITY WATER QUALITY SHEET									
Project: TVA Fly Ash ; EMR-EL-AF				Test Initiation Date: 6-26-09		Time: 1330 Day 0			
Laboratory: EPR				Test Termination Date: 7-6-09		Time: 0900			
Test Species: Adult <i>Daphnia pulex</i>				Page 1 of 1					
Exposure duration: 10-d				Environmental chamber temperature: 20					
Conc.	Repl.	Temperature [17 - 23 °C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Alkalinity (mg/L) ⁰	Hardness (mg/L) ⁰	Ammonia (mg/L) ⁰	Comments
Control	A	21.1	8.31	9.44	290			<1	
	B	20.9	8.24	9.46	280			NC	
	C	20.9	8.03	9.70	280				
	D	20.6	8.19	9.01	280				
	E	20.0	8.19	9.84	280				
0%	A	19.4	7.42	9.67	90	104	20	<1	
	B	18.9	7.39	9.68	90				
	C	19.0	7.40	9.83	90				
	D	18.9	7.44	9.78	90				
	E	18.9	7.47	9.60	90				
10%	A	19.1	7.16	9.85	90	100		<1	
	B	18.8	7.19	9.78	90				
	C	18.7	7.34	9.63	90				
	D	19.1	7.39	9.84	90				
	E	18.9	7.38	9.89	90				
50%	A	19.2	7.41	9.73	110			<1	
	B	19.0	7.51	9.65	110				
	C	18.9	7.56	9.66	110				
	D	18.7	7.59	9.44	100				
	E	18.6	7.60	9.88	110				
100%	A	19.2	7.14	8.94	120	100	22	<1	
	B	19.0	7.31	9.44	120				
	C	18.9	7.44	9.19	120				
	D	18.9	7.56	9.30	130				
	E	18.9	7.62	9.27	120				
Initials: MA		MA	NC	NC	MA	MA	NC		
Date: 1:00		1:00	3:30	1:50	4:00	4:00	4:00		
Time: 6/26/09		6/26/09	6/26/09	6/26/09	6/26/09	6/26/09	6/26/09		
Initials (QA): NC		NC	MA	NC	MA	MA	NC		

Reviewed by

AK

Date

7-14-09

Comment

Crossed out value
not needed

1

WATER QUALITY MONITORING SHEET

Project: <i>TVA F17 A54</i>				Test Initiation Date: <i>6-26-09</i> Time: <i>1330</i>		
Site ID: <i>EMR-EL-LF</i>						
Laboratory: <i>ERDC</i>				Test Date(s): <i>6-27-09</i> Time: <i>1330</i>		
Test Species: <i>Larval Pimephales promelas</i>				Page 1 of 1 Test day: 1		
Exposure duration: 10 day				Environmental chamber temperature: <i>20</i>		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	<i>A</i>	<i>20.0</i>	<i>270</i>	<i>8.21</i>	<i>7.3</i>	
0%	<i>A</i>	<i>19.9</i>	<i>100</i>	<i>7.90</i>	<i>7.9</i>	
10%	<i>A</i>	<i>19.9</i>	<i>90</i>	<i>7.78</i>	<i>7.9</i>	
50%	<i>A</i>	<i>19.9</i>	<i>110</i>	<i>7.63</i>	<i>7.6</i>	
100%	<i>A</i>	<i>19.9</i>	<i>120</i>	<i>7.64</i>	<i>8.1</i>	
Initials		<i>AK</i>				
Date		<i>6-27</i>				
Time		<i>1330</i>				
QA		<i>AK</i>				

AK 7-14-09

WATER QUALITY MONITORING SHEET

Project: <u>TVA Fly Ash</u>				Test Initiation Date: <u>6-26-09</u> Time: <u>1400</u>		
Site ID: <u>SLC-EL-LF</u>						
Laboratory: <u>ERDC</u>				Test Date(s): <u>6-27-09</u> Time: <u>1330</u>		
Test Species: <u>Larval Pimeph. Co. pimephs</u>				Page 1 of 1		Test day: 1
Exposure duration: 10 day				Environmental chamber temperature: <u>20</u>		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	<u>A</u>	<u>20.0</u>	<u>270</u>	<u>8.21</u>	<u>7.3</u>	
0%	<u>A</u>	<u>19.9</u>	<u>100</u>	<u>7.90</u>	<u>7.9</u>	
10%	<u>A</u>	<u>19.9</u>	<u>110</u>	<u>7.52</u>	<u>7.9</u>	
50%	<u>A</u>	<u>20.1</u>	<u>180</u>	<u>7.68</u>	<u>8.1</u>	
100%	<u>A</u>	<u>20.1</u>	<u>260</u>	<u>7.99</u>	<u>8.2</u>	
Initials		<u>AK</u>	_____	_____	_____	
Date		<u>6-27</u>	_____	_____	_____	
Time		<u>1330</u>	_____	_____	_____	
QA		<u>AK</u>	_____	_____	_____	

AK 7-14-09

WATER QUALITY MONITORING SHEET						
Project: <u>TVA FLA SL</u>				Test Initiation Date: <u>6-26-09</u> Time: <u>1330</u>		
Site ID: <u>ERDC EMR-EL-AF</u>						
Laboratory: <u>ERDC</u>				Test Date(s): <u>6-27-09</u> Time: <u>1330</u>		
Test Species: <u>Adult Pimephales promelas</u>				Page <u>1</u> of <u>1</u> Test day: <u>1</u>		
Exposure duration: <u>10 day</u>				Environmental chamber temperature: <u>20</u>		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	<u>A</u>	<u>20.9</u>	<u>290</u>	<u>8.00</u>	<u>10.0</u>	
0%	<u>A</u>	<u>20.7</u>	<u>100</u>	<u>7.38</u>	<u>10.0</u>	
10%	<u>A</u>	<u>20.3</u>	<u>110</u>	<u>7.35</u>	<u>9.7</u>	
50%	<u>A</u>	<u>20.9</u>	<u>110</u>	<u>7.40</u>	<u>10.0</u>	
100%	<u>A</u>	<u>20.3</u>	<u>120</u>	<u>7.44</u>	<u>9.4</u>	
Initials		<u>AK</u>				
Date		<u>6-27</u>				
Time		<u>1330</u>				
QA		<u>AK</u>				

AK 7-14-09

WATER QUALITY MONITORING SHEET						
Project: <i>JVA Fly Ash</i>				Test Initiation Date: <i>6-26-09</i> Time: <i>1330</i>		
Site ID: <i>EMR-EL-LF</i>						
Laboratory: <i>ERDC</i>				Test Date(s): <i>6-28-09</i> Time: <i>1300</i>		
Test Species: <i>Larval Pimephales promelas</i>				Page of		Test day: <i>2</i>
Exposure duration: 10 day				Environmental chamber temperature: <i>20</i>		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	<i>B</i>	<i>20.0</i>	<i>270</i>	<i>8.10</i>	<i>8.1</i>	
0%	<i>B</i>	<i>20.0</i>	<i>90</i>	<i>7.57</i>	<i>7.2</i>	
10%	<i>B</i>	<i>20.0</i>	<i>90</i>	<i>7.54</i>	<i>7.6</i>	
50%	<i>B</i>	<i>20.0</i>	<i>110</i>	<i>7.58</i>	<i>8.3</i>	
100%	<i>B</i>	<i>19.9</i>	<i>120</i>	<i>7.61</i>	<i>8.2</i>	
Initials		<i>AK</i>	<i>AK</i>	_____	_____	
Date		<i>6-28</i>	<i>6-28</i>	_____	_____	
Time		<i>1300</i>	<i>1300</i>	_____	_____	
QA		<i>CCK</i>	_____	_____	_____	

AK 7-14-09

WATER QUALITY MONITORING SHEET						
Project: TVA FL7A54			Test Initiation Date: 6-26-09 Time: 1330			
Site ID: SLC-EL-LF						
Laboratory: ERDC			Test Date(s): 6-28-09 Time: 1300			
Test Species: Larval Pimephales promelas			Page 1 of 1		Test day: 2	
Exposure duration: 10 day			Environmental chamber temperature: 20			
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	B	20.0	270	8.00	8.1	
0%	B	20.0	90	7.57	7.2	
10%	B	20.0	110	7.59	8.2	
50%	B	AK 20.2-20.0	180	7.72	8.5	
100%	B	19.9	250	8.03	8.5	
Initials		AK				
Date		6-28				
Time		1300				
QA		CCK				

AK 7-14-09

WATER QUALITY MONITORING SHEET						
Project: <u>TVA FLA 34</u>			Test Initiation Date: <u>6-26-09</u> Time: <u>1330</u>			
Site ID: <u>EMR-EL-AF</u>						
Laboratory: <u>EFDC</u>			Test Date(s): <u>6-28-09</u> Time: <u>1300</u>			
Test Species: <u>ALH Pimephales promelas</u>			Page <u>1</u> of <u>1</u>		Test day: <u>2</u>	
Exposure duration: <u>10 day</u>			Environmental chamber temperature: <u>20</u>			
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	<u>B</u>	<u>20.8</u>	<u>280</u>	<u>8.00</u>	<u>9.2</u>	
0%	<u>B</u>	<u>20.7</u>	<u>100</u>	<u>7.71</u>	<u>4.2 *</u>	
10%	<u>B</u>	<u>20.1</u>	<u>100</u>	<u>7.42</u>	<u>9.5</u>	
50%	<u>B</u>	<u>20.8</u>	<u>110</u>	<u>7.44</u>	<u>9.7</u>	
100%	<u>B</u>	<u>20.3</u>	<u>130</u>	<u>7.51</u>	<u>9.3</u>	
Initials		<u>AK</u>	_____	_____	_____	
Date		<u>6-28</u>	_____	_____	_____	
Time		<u>1300</u>	_____	_____	_____	
QA		<u>CLK</u>	_____	_____	_____	

* Corrective action initiated. Aeration restored

AK- 7-14-09

WATER QUALITY MONITORING SHEET						
Project: TUA Fly Ash				Test Initiation Date: 6-26-09 Time: 1330		
Site ID: EMR-EC-LF						
Laboratory: ERDC				Test Date(s): 6/29/09 Time: 1430		
Test Species: <i>Carid. R. leachii</i>				Page 1 of 1		Test day: 3
Exposure duration: 10 day				Environmental chamber temperature: 20.0		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	C	20.6	280	8.18	8.71	1
0%	C	20.6	100	7.76	8.45	1
10%	C	20.3	100	7.66	8.32	1
50%	C	20.4	120	7.71	8.33	<1
100%	C	20.7	140	7.80	8.42	1
Initials		MA	MA	MA	MA	NC
Date		6/29/09	6/29/09	6/29/09	6/29/09	6/29/09
Time		1500	1500	1500	1500	1500
QA		NC	NC	NC	NC	MA

AK 7-14-09

Cross-out
Should be 6/29/09

WATER QUALITY MONITORING SHEET						
Project: TVA FLUPBN				Test Initiation Date: 6/26/09 Time: 1330		
Site ID: SLC-EN-LF						
Laboratory: ERDC				Test Date(s): 6/29/09 Time: 1500		
Test Species: Larval <i>Pimephales promelas</i>				Page 1 of 1 Test day: 3		
Exposure duration: 10 day				Environmental chamber temperature: 20.0		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	C	-	-	-	-	-
0%	C	-	-	-	-	-
10%	C	20.8	120	7.76	8.18	1
50%	C	20.8	190	7.77	8.14	1
100%	C	20.9	290	8.09	8.19	1
Initials		MA	MA	MA	MA	NC
Date		6/29/09	6/29/09	6/29/09	6/29/09	6/29/09
Time		1500	1500	1500	1500	1500
QA		NC	NC	NC	NC	MA

AK 7-14-09 See EMR for CONTROL

& Or.

Crossed out value should
be dated 6/29

WATER QUALITY MONITORING SHEET						
Project: TVA Fly Ash				Test Initiation Date: 6/20/09 Time: 1400		
Site ID: EMR-EL-AF						
Laboratory: ERDC				Test Date(s): 6/29/09 Time: 1511		
Test Species: Juvenile <i>Pimephales promelas</i>				Page 1 of 1 Test day: 3		
Exposure duration: 10 day				Environmental chamber temperature: 20.0		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	C	20.5	290	8.08	8.13	1
0%	C	20.4	110	7.73	7.81	1
10%	C	20.5	110	7.81	8.21	1
50%	C	20.5	110	7.75	8.38	1
100%	C	20.7	140	7.76	7.91	1
Initials		MA	MA	MA	MA	NC
Date		6/29/09	6/29/09	6/29/09	6/29/09	6/29/09
Time		1511	1511	1511	1511	1511
QA		NC	NC	NC	NC	MA

AK 7-14-09

WATER QUALITY MONITORING SHEET						
Project: TNA Fly Pond				Test Initiation Date: 6/26/09 Time: 1:00		
Site ID: EMP2-EL-2F						
Laboratory: ERDC				Test Date(s): 6/30/09 Time: 9:00		
Test Species: Larval Bimphales prineps				Page 1 of 1		Test day: 4
Exposure duration: 10 day				Environmental chamber temperature: 20.1		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	D	20.1	280	8.66	7.93	<1
0%	D	20.1	90	7.93	8.17	<1
10%	D	20.1	90	7.76	8.26	<1
50%	D	20.1	110	7.70	8.30	<1
100%	D	20.1	130	7.56	6.64	<1
Initials		NC	NC	NC	NC	NC
Date		6/30/09	6/30/09	6/30/09	6/30/09	6/30/09
Time		9:00	9:00	9:00	9:00	9:00
QA		MA	MA	MA	MA	MA

AK 7-14-09

WATER QUALITY MONITORING SHEET						
Project: TVA Flyfish				Test Initiation Date: 6/26/09 Time: 1400		
Site ID: SLC-EL-CP						
Laboratory: ERDC				Test Date(s): 6/30/09 Time: 10:00		
Test Species: larval <i>Pimephales promelas</i>				Page 1 of 1		Test day: 4
Exposure duration: 10 day				Environmental chamber temperature: 20.1		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	—	—	—	—	—	—
0%	—	—	—	—	—	—
10%	D	20.1	110	7.61	8.24	<1
50%	D	20.0	160	7.76	8.42	<1
100%	D	20.0	2100	8.00	8.35	<1
Initials		NL				
Date		6/30/09				
Time		10:00				
QA		MA MA MA MA MA				

AK 7-14-09

WATER QUALITY MONITORING SHEET						
Project: TVA Flyash				Test Initiation Date: 6/29/09 Time: 1400		
Site ID: Emb-EL-AF						
Laboratory: ERDC				Test Date(s): 6/30/09 Time: 10:00		
Test Species: ^{Adult} AI Pimephales promelas				Page 1 of 1 Test day: 4		
Exposure duration: 10 day				Environmental chamber temperature: 20.1		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	D	20.2	280	8.04	8.41	1
0%	D	20.1	100	7.75	8.56	1
10%	D	20.0	100	7.74	8.60	1
50%	D	20.4	100	7.71	8.54	1
100%	D	20.2	130	7.73	8.52	1
Initials		MA				
Date		6/30/09				
Time		10:00				
QA		NC	NC	NC	NC	NC

AK 7-14-09

WATER QUALITY MONITORING SHEET						
Project: TVA FlyAsh				Test Initiation Date: 6-26-09 Time: 1330		
Site ID: EMR-EL-2F						
Laboratory: ERDC				Test Date(s): 7/1/09		Time: 8:30
Test Species: Larval <i>Pimephales promelas</i>				Page 1 of 1		Test day: 5
Exposure duration: 10 day				Environmental chamber temperature: 20.0		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	E	20.3	280	8.14	8.60	<1
0%	E	20.2	100	8.19	8.59	<1
10%	E	20.1	100	8.02	8.73	<1
50%	E	20.1	110	7.94	8.49	<1
100%	E	20.2	120	7.95	8.42	<1
Initials		MA				
Date		7/1/09				
Time		8:30				
QA		NC NC NC NC NC				

AK 7-14-09

WATER QUALITY MONITORING SHEET						
Project: TVA Fly Ash				Test Initiation Date: 6/26/09 Time: 1330		
Site ID: SLC-EL-LF						
Laboratory: ERDC				Test Date(s): 7/1/09 Time: 9:00		
Test Species: Larval Pimephales promelas				Page 1 of 1 Test day: 5		
Exposure duration: 10 day				Environmental chamber temperature: 20.1		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control						
0%						
10%	E	20.3	110	7.87	8.61	<1
50%	E	20.2	150	7.77	7.76	<1
100%	E	20.2	260	8.23	8.85	<1
Initials	MA					
Date	7/1/09					
Time	9:00					
QA	NC NC NC NC NC NC					

AK 7-14-09

WATER QUALITY MONITORING SHEET						
Project: TUA FlyAsh			Test Initiation Date: 6-26-09 Time: 1400			
Site ID: EMB-EL-AF						
Laboratory: ERDC			Test Date(s): 7/1/09 Time: 11:30			
Test Species: ALH Pimephales promelas			Page of Test day: 5			
Exposure duration: 10 day			Environmental chamber temperature: 20.0			
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	E	20.5	280	8.19	8.45	1
0%	E	20.2	100	7.77	8.62	1
10%	E	20.2	100	7.71	8.71	1
50%	E	20.4	120	7.60	8.21	1
100%	E	20.3	140	7.67	8.34	2
Initials		NC				
Date		7/1/09				
Time		11:20				
QA		MA				

AK 7-14-09

WATER QUALITY MONITORING SHEET						
Project: IVA Fly Ash				Test Initiation Date: 6-26-09 Time: 1330		
Site ID: EMP-EL-LF						
Laboratory: ERDC				Test Date(s): 7/2/09 Time: 2:00		
Test Species: Larval <i>Pimephales promelas</i>				Page 1 of 1 Test day: 6		
Exposure duration: 10 day				Environmental chamber temperature: 20		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	A	20.4	280	8.43	8.94	1
0%	A	20.4	100	8.09	8.96	<1
10%	A	20.5	100	7.92	9.26	<1
50%	A	20.6	120	7.77	8.38	1
100%	A	20.7	130	7.91	8.82	<1
Initials		MA				
Date		7/2/09				
Time		2:00				
QA		NC				

AK 7-14-09

WATER QUALITY MONITORING SHEET						
Project: TVA- Fly Ash				Test Initiation Date: 6/26/09 Time: 1330		
Site ID: SLC-EL-LF						
Laboratory: ERDC				Test Date(s): 7/2/09 Time: 2:30		
Test Species: Larval <i>Pimephales promelas</i>				Page 1 of 1 Test day: 5		
Exposure duration: 10 day				Environmental chamber temperature: 20.0		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	—	—	—	—	—	—
0%	—	—	—	—	—	—
10%	A	20.6	120	7.92	9.43	1
50%	A	20.7	110	7.94	8.94	1
100%	A	20.7	280	8.14	8.92	1
Initials		NC				
Date		7/2/09				
Time		2:30				
QA		MA				

AK 7-14-09

WATER QUALITY MONITORING SHEET						
Project: <u>TVA Fly Ash</u>				Test Initiation Date: <u>6-26-09</u> Time: <u>1400</u>		
Site ID: <u>EMR-EL-AF</u>						
Laboratory: <u>ERL</u>				Test Date(s): <u>7/2/09</u> Time: <u>3:00</u>		
Test Species: <u>Adult <i>Rimophanes pomelus</i></u>				Page 1 of 1 Test day: <u>3</u>		
Exposure duration: 10 day				Environmental chamber temperature: <u>20.0</u>		
Treatment	Repl.	Temp. (17-23 °C)	Conductivity (uS/cm)	pH (6.5 - 9.0)	D.O. (>4 mg/L)	Ammonia (mg/L)
Control	A	<u>21.2</u>	<u>300</u>	<u>8.22</u>	<u>9.31</u>	<u>2</u>
0%	A	<u>20.8</u>	<u>120</u>	<u>7.87</u>	<u>8.85</u>	<u>2</u>
10% <u>50%</u>	A	<u>20.9</u>	<u>140</u>	<u>7.87</u>	<u>8.99</u>	<u>1</u>
10% <u>50%</u> <u>10%</u>	A	<u>20.3</u>	<u>110</u>	<u>7.87</u>	<u>8.95</u>	<u>2</u>
100%	A	<u>20.3</u>	<u>140</u>	<u>7.86</u>	<u>8.86</u>	<u>2</u>
Initials		<u>MA</u>				
Date		<u>7/2/09</u>				
Time		<u>3:00</u>				
QA		<u>NC</u>				

AK

7-14-09

Note: All values
switched in blank
to - 50% & 10%.

ELUTRIATE TOXICITY WATER QUALITY SHEET

Project: TVA F17 ASL Test Initiation Date: 6-26-09 Time: 1330
 Site ID: EMR-EL-LF Test Date: 7-3-09 Time: 0900
 Laboratory: ERDC Test Termination Date: 7-6-09 Time: 0900
 Test Species: Larval *Pimephales promelas* Page 1 of 1
 Exposure duration: 10-d Environmental chamber temperature: 20

Conc.	Repl.	Temperature [17 - 23 ° C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Ammonia (mg/L)	Comments
Control	B	20.2	8.47	2.8	280		
0%	B	20.1	8.05	7.6	100		
10%	B	20.1	8.01	7.5	7.3 ± 100		
50%	B	20.1	7.91	6.7	120		
100%	B	20.0	7.94	7.5	130		
Initials:		AK					
Date		7-3					
Time		0930					
Initials (QA):		JG					

Reviewed by AK Date 7-14-09 Comment _____

ELUTRIATE TOXICITY WATER QUALITY SHEET

Project: <u>TVA Fly Ash</u>				Test Initiation Date: <u>6-26-09</u>		Time: <u>1330</u>	
Site ID: <u>SLC-EL-LF</u>				Test Date: <u>7-3-09</u> / <u>7</u>		Time: <u>0900</u>	
Laboratory: <u>EDC</u>				Test Termination Date: <u>7-6-09</u>		Time: <u>0900</u>	
Test Species: <u>Carroll Rhyacophila promelas</u>				Page <u>1</u> of <u>1</u>			
Exposure duration: <u>10-d</u>				Environmental chamber temperature: <u>20</u>			
Conc.	Repl.	Temperature [17 - 23 ° C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Ammonia (mg/L)	Comments
Control							
0%							
10%	<u>B</u>	<u>20.1</u>	<u>7.95</u>	<u>7.9</u>	<u>120</u>		
50%	<u>B</u>	<u>20.1</u>	<u>7.99</u>	<u>7.0</u>	<u>170</u>		
100%	<u>B</u>	<u>19.9</u>	<u>8.43</u>	<u>7.8</u>	<u>280</u>		
Initials:		<u>AK</u>					
Date		<u>7-3</u>					
Time		<u>0930</u>					
Initials (QA):		<u>VG</u>					

Reviewed by AK Date 7-14-09 Comment _____

ELUTRIATE TOXICITY WATER QUALITY SHEET

Project: <u>TVA Fly Ash</u>					Test Initiation Date: <u>6-26-09</u>		Time: <u>1330</u>	
Site ID: <u>EMR-EL-AE</u>					Test Date: <u>7-3-09</u>		Time: <u>0900</u>	
Laboratory: <u>ERDC</u>					Test Termination Date: <u>7-6-09</u>		Time: <u>0900</u>	
Test Species: <u>AL-14 Pimeph. us pome. l.</u>					Page <u>1</u> of <u>1</u>			
Exposure duration: <u>10-7</u>					Environmental chamber temperature: <u>20</u>			
Conc.	Repl.	Temperature [17 - 23 ° C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Ammonia (mg/L)	Comments	
Control	<u>B</u>	<u>21.0</u>	<u>8.47</u>	<u>8.2</u>	<u>300</u>			
0%	<u>B</u>	<u>20.7</u>	<u>8.88</u>	<u>8.5</u>	<u>120</u>			
10%	<u>B</u>	<u>20.5</u>	<u>8.04</u>	<u>8.6</u>	<u>120</u>			
50%	<u>B</u>	<u>21.0</u>	<u>8.00</u>	<u>8.4</u>	<u>130</u>			
100%	<u>B</u>	<u>20.6</u>	<u>8.05</u>	<u>8.4</u>	<u>160</u>			
Initials:		<u>AK</u>						
Date		<u>7-3</u>						
Time		<u>0930</u>						
Initials (QA):		<u>SG</u>						

Reviewed by AK Date 7-14-09 Comment _____

ELUTRIATE TOXICITY WATER QUALITY SHEET

Project: TVA F17 AS 4 Test Initiation Date: 6-26-09 Time: 1530
 Site ID : EMR-EL-LF Test Date: 7-4-09 8 Time: 1200
 Laboratory: FRDC Test Termination Date: 7-6-09 Time: 0900
 Test Species: Larval Pimephales promelas Page 1 of 1
 Exposure duration: 10-01 Environmental chamber temperature: 20

Conc.	Repl.	Temperature [17 - 23 ° C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Ammonia (mg/L)	Comments
Control	C	20.1	8.36	6.9	240		
0%	C	20.1	7.74	6.8	100		
10%	C	20.1	7.86	7.0	90		
50%	C	20.1	7.82	7.1	110		
100%	C	20.1	7.94	7.4	130		
Initials:		AK					
Date		7-4					
Time		1200					
Initials (QA):		AK					

Reviewed by AK Date 7-11-09 Comment _____

ELUTRIATE TOXICITY WATER QUALITY SHEET

Project: <u>TVA Fly Ash</u>				Test Initiation Date: <u>6-26-09</u>		Time: <u>1330</u>	
Site ID : <u>SLC-EL-LF</u>				Test Date: <u>7-4-09</u>		Time: <u>1200</u>	
Laboratory: <u>ERDC</u>				Test Termination Date: <u>7-6-09</u>		Time: <u>0900</u>	
Test Species: <u>Larval <i>Pimephales promelas</i></u>				Page <u>1</u> of <u>1</u>			
Exposure duration: <u>10-d</u>				Environmental chamber temperature: <u>20</u>			
Conc.	Repl.	Temperature [17 - 23 ° C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Ammonia (mg/L)	Comments
Control							
0%							
10%	C	20.2	7.85	7.3	110		
50%	C	20.1	8.05	7.6	180		
100%	C	20.0	8.28	7.3	260		
Initials:		<u>AK</u>					
Date		<u>7-4</u>					
Time		<u>1200</u>					
Initials (QA):		<u>AK</u>					

Reviewed by AK Date 7-14-09 Comment _____

ELUTRIATE TOXICITY WATER QUALITY SHEET

Project: TVA Fly Ash Test Initiation Date: 6-26-09 Time: 1330
 Site ID: FMR-EL-AF Test Date: 7-4-09 Time: 1200
 Laboratory: EDX Test Termination Date: 7-6-09 Time: 0900
 Test Species: Adult P. promelas Page 1 of 1
 Exposure duration: 10-01 Environmental chamber temperature: 20

Conc.	Repl.	Temperature [17 - 23 ° C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Ammonia (mg/L)	Comments
Control	C	20.6	8.26	9.6	280		
0%	C	20.5	7.71	9.1	100		
10%	C	21.4	7.68	8.9	100		
50%	C	21.9	7.73	8.6	120		
100%	C	22.4	7.94	9.1	130		
Initials:		AK					
Date		7.4					
Time		1200					
Initials (QA):		AK					

Reviewed by AK Date 7-14-09 Comment _____

ELUTRIATE TOXICITY WATER QUALITY SHEET

Project: TRFEL 454 Test Initiation Date: 6-26-09 Time: 1330
 Site ID: EMR-EL-LF Test Date/Day: 7-5-09 9 Time: 1130
 Laboratory: ERTC Test Termination Date: 7-6-09 Time: 0900
 Test Species: Juvenl Pimeph. lu p. mchls Page 1 of 1
 Exposure duration: 10 - 1 Environmental chamber temperature: 20

Conc.	Repl.	Temperature [17 - 23 ° C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Ammonia (mg/L)	Comments
Control	D	20.3	8.17	6.9	270	<1	
0%	D	20.1	7.61	6.9	100	<1	
10%	D	20.1	7.60	6.6	100	<1	
50%	D	20.1	7.46	6.4	110	<1	
100%	D	20.0	7.73	6.7	130	<1	
Initials:		AK					
Date		7-5					
Time		1130					
Initials (QA):		AK					

Reviewed by AK Date 7-14-09 Comment _____

ELUTRIATE TOXICITY WATER QUALITY SHEET

Project: FAFLAS Test Initiation Date: 6-26-09 Time: 1320
 Site ID: SLC-EL-LE Test Date/Day: 7-5-09 / 9 Time: 1120
 Laboratory: ERDC Test Termination Date: 7-6-09 Time: 0900
 Test Species: Larval *Pimephales promelas* Page 1 of 1
 Exposure duration: 10-d Environmental chamber temperature: 20

Conc.	Repl.	Temperature [17 - 23 ° C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Ammonia (mg/L)	Comments
Control							
0%							
10%	AKQD	20.1	7.62	7.3	120	< 1	
50%	AKQD	20.1	7.54	6.4	190	< 1	
100%	D	20.0	8.06	6.4	270	< 1	
Initials:	AK						
Date	7-5						
Time	1140						
Initials (QA):	AK						

Reviewed by AK Date 7-14-09 Comment _____

ELUTRIATE TOXICITY WATER QUALITY SHEET

Project: TVAF17 AS 4 Test Initiation Date: 6-26-09 Time: 1330
 Site ID: EMR-EL-AF Test Date/Day: 7-5-09 / 9 Time: 1300
 Laboratory: FEPL Test Termination Date: 7-6-09 Time: 0900
 Test Species: AL-1 + Pimephales promelas Page 1 of 1
 Exposure duration: 10-d Environmental chamber temperature: 20

Conc.	Repl.	Temperature [17 - 23 ° C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Ammonia (mg/L)	Comments
Control	D	20.4	7.91	7.4	280		
0%	D	20.4	7.48	8.1	110		
10%	D	20.2	7.58	8.3	110		
50%	D	20.6	7.48	7.4	130		
100%	D	20.4	7.75	8.4	140		
Initials:		AK					
Date		7-5					
Time		1140					
Initials (QA):		AK					

Reviewed by AK Date 7-14-09 Comment _____

ELUTRIATE TOXICITY WATER QUALITY SHEET

Project: <u>TWA Fly Ash EMP-EL-LF</u>					Test Initiation Date:		Time:		
Laboratory: <u>ERDC</u>					Test Termination Date:		Time: <u>8:00</u>		
Test Species: <u>Larval Pimephales promelas</u>					Page of				
Exposure duration:					Environmental chamber temperature: <u>19.9</u>				
Conc.	Repl.	Temperature [17 - 23 °C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Comments
Control	A	20.3	8.16	8.36	280			<1	
	B	20.3	8.14	9.16	286				
	C	20.3	8.18	9.31	280				
	D	20.2	8.20	9.36	280				
	E	20.3	8.21	9.46	280				
0%	A	20.3	7.76	9.48	110			<1	
	B	20.3	7.76	9.36	100				
	C	20.2	7.74	9.03	100				
	D	20.2	7.72	9.38	100				
	E	20.3	7.70	9.48	100				
10%	A	20.3	7.64	9.44	100			<1	
	B	20.3	7.68	9.48	100				
	C	20.3	7.65	9.08	100				
	D	20.3	7.67	9.00	100				
	E	20.2	7.65	9.32	100				
50%	A	20.7	7.67	9.34	120			<1	
	B	20.8	7.66	9.34	120				
	C	20.7	7.73	9.32	120				
	D	20.5	7.75	9.28	120				
	E	20.4	7.75	8.91	120				
100%	A	20.0	7.77	9.40	140				
	B	20.0	7.83	9.40	120				
	C	20.1	7.82	9.37	140				
	D	20.1	7.84	9.38	140				
	E	20.0	7.85	9.41	146				
Initials: <u>NC</u>		<u>NC</u>	<u>NC</u>	<u>NC</u>				<u>MA</u>	
Date: <u>7/6/09</u>									
Time: <u>8:00</u>									
Initials (QA): <u>MA</u>								<u>NC</u>	

Reviewed by _____ Date _____ Comment _____

ELUTRIATE TOXICITY WATER QUALITY SHEET

Project: <u>TWA Fly Ash SLC-EL-1f</u>		Test Initiation Date: <u>6-26-09</u>		Time: <u>1330</u>					
Laboratory: <u>ERDC</u>		Test Termination Date: <u>7-6-09</u>		Time: <u>1100</u>					
Test Species: <u>(ana) Amphipods promelas</u>		Page 1 of 1							
Exposure duration: <u>10-7</u>		Environmental chamber temperature: <u>20</u>							
Conc.	Repl.	Temperature [17 - 23 °C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Comments
Control	A								
	B								
	C								
	D								
	E								
0%	A								
	B								
	C								
	D								
	E								
10%	A	20.6	7.58	8.98	120			<1	
	B	20.6	7.65	8.87	110				
	C	20.6	7.63	9.06	120				
	D	20.6	7.62	9.04	120				
	E	20.6	7.61	9.40	120				
50%	A	20.3	7.80	9.83	190			<1	
	B	20.3	7.80	9.74	190				
	C	20.3	7.84	9.77	190				
	D	20.5	7.83	9.42	190				
	E	20.6	7.82	9.05	190				
100%	A	20.8	8.06	9.80	290			<1	
	B	20.7	8.07	9.92	280				
	C	20.7	8.07	9.41	280				
	D	20.4	8.09	9.55	280				
	E	20.4	8.11	9.50	270				
Initials: <u>MY</u>									
Date: <u>7/6/09</u>									
Time: <u>9:52</u>									
Initials (QA): <u>NC</u>									

Reviewed by AK Date 7-14-09 Comment _____

ELUTRIATE TOXICITY WATER QUALITY SHEET									
Project: <u>TVA Fly Ash EMR-EL-AF-100</u>					Test Initiation Date: <u>6-26-09</u>		Time: <u>1330</u>		
Laboratory: <u>ERDC</u>					Test Termination Date: <u>7-6-09</u>		Time: <u>1100</u>		
Test Species: <u>Adult Pimephales promelas</u>					Page <u>1</u> of <u>1</u>				
Exposure duration: <u>10-d</u>					Environmental chamber temperature: <u>20</u>				
Conc.	Repl.	Temperature [17 - 23 °C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Comments
Control	A	20.8	7.96	9.04	300			2	
	B	20.6	8.03	9.27	290			1	
	C	20.5	8.08	9.20	290			1	
	D	20.4	8.02	9.08	290			1	
	E	20.4	8.11	9.36	290			1	
0%	A	20.5	7.77	9.37	110			1	
	B	20.5	7.71	9.63	120			1	
	C	20.4	7.66	9.48	110			1	
	D	20.3	7.62	9.77	120			1	
	E	20.1	7.64	9.42	110			1	
10%	A	20.2	7.60	9.27	110			1	
	B	20.4	7.62	9.52	110			1	
	C	20.3	7.56	9.38	120			1	
	D	20.2	7.66	9.24	110			1	
	E	20.3	7.65	9.37	120			1	
50%	A	20.8	7.66	9.08	130			1	
	B	20.7	7.59	9.57	140			1	
	C	20.7	7.60	9.19	130			1	
	D	20.5	7.62	9.22	140			2	
	E	20.5	7.64	9.33	150			1	
100%	A	20.5	7.71	9.23	150			1	
	B	20.4	7.74	9.08	140			1	
	C	20.4	7.71	9.27	150			1	
	D	20.4	7.71	9.48	150			1	
	E	20.4	7.75	9.48	150			1	
Initials: <u>WY</u>									
Date: <u>7/6/09</u>									
Time: <u>11:00</u>									
Initials (QA): <u>N/C</u>									

Reviewed by

AK

Date

7-14-09

Comment

Missing value for
D.O. (50% - B).
(crossed out value
should be entered
7-6-09)

EMR-EL-LF

ELUTRIATE TOXICITY TEST SHEET

Project: TVA Fly Ash		EMR-EL-LF		Test Initiation Date: 20-June-09		Time: 1400	
Laboratory: ERDC				Test Termination Date: 6-July-09		Time: 0900	
Test Species: <i>Pimephales promelas</i> , Larval				Page 1 of 1			
Exposure duration: 10-d				Environmental chamber temperature: 20			

Conc.	Repl.	No. Loaded	Number Alive										Comments
			1 d	2 d	3 d	4 d	5 d	6 d	7 d	8 d	9 d	10 d	
Control	A	10	10	10	10	10	10	10	9	9	8	8	
	B	10	10	10	10	10	10	10	10	9	8	8	
	C	10	10	10	10	10	10	10	9	9	8	8	
	D	10	10	10	10	10	10	10	10	10	8	8	
	E	10	10	10	10	10	10*	9	8	8	8	8	
0%	A	10	10	10	10	10	10*	9	9	9	8	8	
	B	10	9	9	9	9	9	9	9	9	8*	8*	
	C	10	10	9	9	9	9	9	9	9	8	8	
	D	10	10	10	10	9	8	8*	8*	7	6	5*	
	E	10	10	10	10	10	10	10	10	10*	8*	8*	
10%	A	10	10	10	10	10	10	10	9	9	8	7	
	B	10	9	9	9	9	9	9	9	9	8	7	
	C	10	10	9	9	9	9	9	9*	8	8	7	
	D	10	10	10	10	10	10	9	9	9	7	6	
	E	10	10	10	10	10	10	10	10	10	10	10	
50%	A	10	(10)	(10)	10	10	10	10	10	10	9*	(7)	
	B	10	(10)	(9)	10	10	9	8	7	7	6	(5)	
	C	10	(10)	(10)	10	10	10	10	10	10	10	(10)	
	D	10	(10)	(10)	10	10	10	10*	10*	(10)	8	(7)	
	E	10	(10)	10	10	10	10	10	10	10	10	(9)	
100%	A	10	(10)	(10)	10	(10)	(10)	(10)	10	(10)	(10)	(9)	
	B	10	(10)	(10)	9	(9)	(9)	(9)	9	(9)	(9)	(9)	
	C	10	(10)	(10)	10	(10)	(10)	(10)	10	10	(10)	(10)	
	D	10	(10)	(10)	10	(10)	(10)	(10)	10	10	(10)	(10)	
	E	10	(10)	(10)	10	(10)	(10)	(10)	10	10	(10)	(10)	
Initials:		AK	AK	AK	AK	AK	AK	AK	AK	AK	AK	AK	
Date		6-26	6-27	6-28	6-29	6-30	7-1	7-2	7-3	7-4	7-5	7-6	
Time		1400	1300	1300	1430	1300	1300	1300	1000	1201	1159	1215	
Initials (QA):		JW	AK	AK	JW	JW	JW	JW	JW	JW	AK	AK	

Reviewed by

[Signature]

Date

7/13/09

Comment

parentheses at day-10 should not be there

* At least one fish impaired swimming

SLC-EL-LF

ELUTRIATE TOXICITY TEST SHEET

Project: <u>TVA Fly Ash: SLC-EL-LF</u>	Test Initiation Date: <u>6-26-09</u>	Time: <u>1400</u>
Laboratory: <u>FRDC</u>	Test Termination Date: <u>7-6-09</u>	Time: <u>0900</u>
Test Species: <u>Pimephales promelas, larva-1</u>	Page 1 of 1	
Exposure duration: <u>10-d</u>	Environmental chamber temperature: <u>20</u>	

Conc.	Repl.	No. Loaded	Number Alive										Comments
			1 d	2 d	3 d	4 d	5 d	6 d	7 d	8 d	9 d	10 d	
Control	A	10	10	10	10	10	10	10	9	9	8	8	
	B	10	10	10	10	10	10	10	10	9	9	9	
	C	10	10	10	10	10	10	10	9	9	9	9	
	D	10	10	10	10	10	10	10	10	10	9	9	
	E	10	10	10	10	10	10	10	8	8	8	8	
0%	A	10	10	10	10	10	10	9	9	9	8	8	
	B	10	9	9	9	9	9	9	9	9	8	8	
	C	10	10	9	9	9	9	9	9	9	8	8	
	D	10	10	10	10	9	8	8	8	7	8	8	
	E	10	10	10	10	10	10	10	10	10	8	8	
10%	A	10	10	9	9	9	9	9	9	9	9	9	
	B	10	10	10	10	9	9	9	9	9	9	9	
	C	10	10	9	8	9	9	9	9	9	9	9	
	D	10	10	10	9	9	9	9	9	9	9	9	
	E	10	10	9	9	9	9	9	9	9	9	9	
50%	A	10	10	(10)	9	9	9	9	9	9	9	9	
	B	10	10	(10)	10	10	10	10	10	10	10	10	
	C	10	(10)	10	9	9	9	9	9	9	9	9	
	D	10	10	(10)	8	8	8	8	8	8	8	8	
	E	10	10	9	5	3	2	2	2	2	2	2	
100%	A	10	(10)	(10)	10	(10)	(10)	(10)	10	(9)	9	(8)	
	B	10	(10)	(10)	9	(9)	(9)	(7)	6	(6)	6	(5)	
	C	10	(10)	(10)	10	(10)	(10)	(10)	8	(8)	8	(7)	
	D	10	(10)	9	7	7	(7)	(2)	7	(7)	(7)	(5)	
	E	10	(10)	(10)	9	(9)	(9)	(9)	7	(9)	(9)	(7)	
Initials:		AK	AK	AK	AK	AK	AK	AK	AK	AK	AK	AK	
Date		6-26	6-27	6-28	6-29	6-30	7-1	7-2	7-3	7-4	7-5	7-6	
Time		1400	1300	1300	1430	1300	1300	1300	1030	1200	1147	0745	
Initials (QA):		JW	AK	AK	AK	AK	AK	AK	AK	AK	AK	AK	

Reviewed by

[Signature]

Date

7/13/09

Comment

parental @ day 10 should not be there

TEST TERMINATION SHEET

Project: <u>TVA Fly Ash</u>							Test Initiation Date: <u>6-24-09</u> Time: <u>1400</u>		
Site ID: <u>EMR-EL-LF</u>									
Laboratory: <u>ERDC</u>							Test Date(s): <u>7-6-09</u> Time: <u>0814</u>		
Test Species: <u>Pimeph. lepromelas, larval</u>							Page <u>1</u> of <u>2</u>		
Exposure duration: <u>10 day</u>							Environmental chamber temperature: <u>20</u>		
Treatment	Repl.	# Alive	# on pan	Pan#	Initials	Pan Wt (g)	Pan+dry tiss (g)	Initials	Comments
Control	A	8	8	1	JB	0.09169	0.09336	NM/AK	
	B	9	9	2	JB	0.09021	0.09185	NM/AK	
	C	9	9	3	JB	0.08941	0.09124	NM/AK	
	D	9	9	4	JB	0.06944	0.07127	NM/AK	
	E	8	8	5	JB	0.07420	0.07595	NM/AK	
0%	A	8	8	6	JB	0.07376	0.07588	NM/AK	
	B	9	9	7	JB	0.07649	0.07833	NM/AK	
	C	7	7	8	JB	0.07040	0.07178	NM/AK	
	D	5	5	9	JB	0.07373	0.07536	NM/AK	
	E	8	8	10	JB	0.08592	0.08769	NM/AK	
10%	A	7	7	11	JB	0.07795	0.07922	NM/AK	
	B	7	7	12	JB	0.06491	0.06627	NM/AK	
	C	7	7	13	JB	0.07210	0.07334	NM/AK	
	D	6	6	14	JB	0.07125	0.07246	NM/AK	
	E	10	10	15	JB	0.07056	0.07213	NM/AK	
50%	A	7	8	16	JB	0.08019	0.08205	NM/AK	
	B	5	5	17	NM	0.08324	0.08450	NM/AK	
	C	10	10	18	NM	0.07419	0.07621	NM/AK	
	D	7	7	19	JB	0.08651	0.08826	NM/AK	
	E	9	9	20	JB	0.08153	0.08374	NM/AK	
100%	A	9	9	21	JB	0.06932	0.07113	NM/AK	
	B	9	10	22	JB	0.07865	0.08060	NM/AK	
	C	9	10	23	JB	0.07473	0.07660	NM/AK	
	D	10	10	24	JB	0.07515	0.07717	NM/AK	
	E	10	10	25	NM	0.07776	0.07972	NM/AK	

PK 7-14-09

TEST TERMINATION SHEET

Project: <u>TVA Fly Ash</u>							Test Initiation Date: <u>6-26-09</u> Time: <u>1400</u>		
Site ID: <u>ELC-FLK LF</u>									
Laboratory: <u>ERDC</u>							Test Date(s): <u>26-09</u> Time: <u>0814</u>		
Test Species: <u>Drosophila melanogaster, larval</u>							Page <u>2</u> of <u>2</u>		
Exposure duration: 10 day							Environmental chamber temperature: <u>20</u>		
Treatment	Repl.	# Alive	# on pan	Pan#	Initials	Pan Wt (g)	Pan+dry tiss (g)	Initials	Comments
10%	A	10	10	26	JS	0.07424	0.07524	NM/AK	
	B	7	8	27	JS	0.08077	0.08239	NM/AK	
	C	7	7	28	JS	0.07717	0.07862	NM/AK	
	D	8	8	29	JS	0.07907	0.08092	NM/AK	
	E	9	9	30	JS	0.07700	0.07909	NM/AK	
50%	A	8	7	31	NM	0.08092	0.08254	NM/AK	
	B	7	7	32	JS	0.07841	0.08021	NM/AK	
	C	9	9	33	JS	0.08518	0.08671	NM/AK	
	D	7	8	34	JS	0.07404	0.07606	NM/AK	
	E	1	1	35	JS	0.06958	0.07007	NM/AK	
100%	A	8	9	36	JS	0.07458	0.07599	NM/AK	
	B	5	5	37	JS	0.07555	0.07689	NM/AK	
	C	8	8	38	JS	0.08178	0.08352	NM/AK	
	D	6	7	39	JS	0.08166	0.08307	NM/AK	
	E	7	7	40	JS	0.08502	0.08646	NM/AK	

KCI Reference test

ELUTRIATE TOXICITY TEST SHEET

Project: <u>TVA Fly Ash, Ref toxicity (KCI)</u>							Test Initiation Date: <u>6-26-09</u>		Time: <u>1400</u>		
Laboratory: <u>ERDC</u>							Test Termination Date: <u>6-30-09</u>		Time: <u>1300</u>		
Test Species: <u>Pimephila promelas (Larvae)</u>							Page <u>1</u> of <u>1</u>				
Exposure duration:							Environmental chamber temperature: <u>20</u>				

Conc.	Repl.	No. Loaded	Number Alive										Comments
			1 d	2 d	3 d	4 d	5 d	6 d	7 d	8 d	9 d	10 d	
Control	A	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>							
	B	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>							
	C	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>							
	D												
	E												
<u>12</u> <u>80%</u>	A	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>9</u>							
	B	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>							
	C	<u>10</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>							
	D												
	E												
<u>25</u> <u>100%</u>	A	<u>10</u>	<u>9</u>	<u>6</u>	<u>6</u>	<u>6</u>							
	B	<u>10</u>	<u>10</u>	<u>7</u>	<u>6</u>	<u>6</u>							
	C	<u>10</u>	<u>8</u>	<u>7</u>	<u>7</u>	<u>7</u>							
	D												
	E												
50%	A	<u>10</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>							
	B	<u>10</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>							
	C	<u>10</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>							
	D	<u>1</u>											
	E												
100%	A	<u>10</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>							
	B	<u>10</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>							
	C	<u>10</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>							
	D												
	E												
Initials:		<u>AK</u>	<u>AK</u>	<u>AK</u>	<u>AK</u>	<u>AK</u>							
Date		<u>6-26</u>	<u>6-27</u>	<u>6-28</u>	<u>6-29</u>	<u>6-30</u>							
Time		<u>1400</u>	<u>1330</u>	<u>1330</u>	<u>1430</u>	<u>1300</u>							
Initials (QA):		<u>JW</u>	<u>AK</u>	<u>AK</u>	<u>JW</u>	<u>JW</u>							

Reviewed by AK

Date 7-14-09

Comment 96-4 ref. toxicity test
terminated @ day - 4

KCl Reference toxicity test

ELUTRIATE TOXICITY WATER QUALITY SHEET									
Project: <u>IVA FL7 437 Ref test</u>				Test Initiation Date: <u>6-26-09</u>		Time: <u>1400</u>			
Laboratory: <u>ERDC</u>				Test Termination Date: <u>6-30-09</u>		Time: <u>1300</u>			
Test Species: <u>Larval Pimephales promelas</u>				Page 1 of 1					
Exposure duration: <u>4-d</u>				Environmental chamber temperature: <u>20</u>					
Conc.	Repl.	Temperature [17 - 23 °C]	pH [6.5 - 9.0 SU]	Dissolved Oxygen [> 4 mg/L]	Conductivity (µS/cm)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Comments
Control	A								
	B								
	C								
	D								
	E								
12%	A	20.8	8.00	8.35	910			<1	
	B	20.1	8.02	8.36	900			<1	
	C	20.9	8.03	8.32	880			<1	
	D								
	E								
25%	A	20.6	7.98	8.28	1490			<1	
	B	20.6	8.02	8.41	1530			<1	
	C	20.8	8.02	8.39	1490			<1	
	D								
	E								
50%	A	20.8	8.25	8.88	over			<1	
	B	20.8	8.27	8.65	over			<1	
	C	20.9	8.28	8.72	over			<1	
	D								
	E								
100%	A	20.9	8.20	8.82	over			<1	
	B	20.9	8.20	8.83	over			<1	
	C	21.0	8.23	8.47	over			<1	
	D								
	E								
Initials:		MA							
Date:		6/30/09							
Time:		12:00							
Initials (QA):		NC	NC	NC	NC	NC	NC	NC	

Reviewed by AK Date 7.14-09 Comment Out water chemistry

ELUTRIATE TOXICITY TEST SHEET

Project: TVA Fly Ash EMR-EL-AF Test Initiation Date: 6-26-09 Time: 1330
 Laboratory: ERDC Test Termination Date: 6-27-09 Time: 1330 0900 AK
 Test Species: Pimephales promelas Adult Page 1 of 1 7-6-09 AK 7-6-09
 Exposure duration: 10-2 Environmental chamber temperature: 20

Conc.	Repl.	No. Loaded	Number Alive										Comments
			1 d	2 d	3 d	4 d	5 d	6 d	7 d	8 d	9 d	10 d	
Control	A	5	5	5	5	5	5	5	5	5	5	5	
	B	5	5	5	5	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	5	5	5	5	
	E	5	5	5	5	5	5	5	5	5	5	5	
0%	A	5	5	5	5	5	5	5	5	5	5	5	
	B	5	5	5	5	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	5	5	5	5	
	E	5	5	5	5	5	5	5	5	5	5	5	
10%	A	5	5	5	5	5	5	5	5	5	5	5	
	B	5	5	5	5	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	5	5	5	5	
	E	5	5	5	5	5	5	5	5	5	5	5	
50%	A	5	(5)	(5)	5	(5)	(5)	5	(5)	(5)	(5)	5	Too Dark; apparent counts
	B	5	(5)	(5)	5	(5)	(5)	5	(5)	(5)	(5)	5	
	C	5	(5)	(5)	5	(5)	(5)	5	(5)	(5)	(5)	5	
	D	5	(5)	(5)	5	(5)	(5)	5	(5)	(5)	(5)	5	
	E	5	(5)	(5)	5	(5)	(5)	5	(5)	(5)	(5)	5	
100%	A	5	(5)	(5)	5	(5)	(5)	(5)	(5)	(5)	(5)	5	see above
	B	5	(5)	(5)	5	(5)	(5)	(5)	(5)	(5)	(5)	5	
	C	5	(5)	(5)	5	(5)	(5)	(5)	(5)	(5)	(5)	5	
	D	5	(5)	(5)	5	(5)	(5)	(5)	(5)	(5)	(5)	5	
	E	5	(5)	(5)	5	(5)	(5)	(5)	(5)	(5)	(5)	5	
Initials:		AK	AK	AK	AK	AK	AK	AK	AK	AK	AK	AK	
Date		6-26	6-27	6-28	6-29	6-30	7-1	7-2	7-3	7-4	7-5	7-6	
Time		1300	1300	1300	1300	1300	1300	0955	1010	1130	1200	1200	
Initials (QA):		JW	AK	AK	AK	AK	AK	AK	AK	AK	AK	AK	

Reviewed by

[Signature]

Date

7/13/09

Comment

Day: 0

Date: 6-26 Technician Initials: AK

Time: 1300

Dilutor counter: 11th

Comments All beakers on air. All loaded. Filtration suspended ~~at~~
bitbottling throughout the day. Air could not be increased
due to equipment stress to larvae.

Day: 1

Date: 6-27

Technician Initials: AK

Time: 1300

Dilutor counter: _____

Comments In BODAC beaker, most particles settled. Control, parameters
OK checked. Particles remained suspended in the
Ad-14 bioassay

Day: 2

Date: 6-28 Technician Initials: AK

Time: 1330

Dilutor counter: 1/0

Comments Counted, checked, parameters. All fish (adult & larvae)
fed.

Day: 3

Date: 6-29 Technician Initials: AK

Time: 1500

Dilutor counter: 1/4

Comments All Paritules appeared settled in larval fish tests. Still
suspended in adult bioassay.

Water change: fish transferred to fresh samples since settled material would
lead to unknown concentrations.

All on air, parameters ok.

Day: 4

Date: 6-30-07 Technician Initials: AK
Time: 1500

Dilutor counter: N/A

Comments All fish counted. Chambers on a/c. Material settled in
larval assay. Material remained suspended in
adult assay.

Image of deceased larval fish (566-501) taken.

All fish fed, feeding behavior observed to be normal
in all treatments

Day: 6

Date: 7-2-09 Technician Initials: AK/JW

Time: 1300

Dilutor counter: 1/4

Comments All chambers in air. Fish counted.

Adults and larvae fed. Feeding behavior normal.

^{AK 7-2} Electrety ~~presented~~ for day 7 water change
presented due to h.i.d.g. Stress @ 2:00

TEST TERMINATION SHEET

Project: IVA FL7 A54 Site ID: EMR-FL-AF Laboratory: FEPC Test Species: Pomph. l. promel., juvenile fish Exposure duration: 10 day

Test Initiation Date: 6-26-09 Time: 1330 Test Date(s): 7-6-09 Time: 0900 Page 1 of 2 Environmental chamber temperature: 20

Treatment	Repl.	Fish	Whole fish length		Whole fish weight		Liver weight				Comments
			CM	Initials	g	Initials	Vial #	Vial weight (g)	Vial + dry weight (g)	Initials	
Control	A	1					1	1.29497		NM	Control fish were not dissected
	A	2					2	1.30493		NM	
	B	1					3	1.27098		NM	
	B	2					4	1.27508		NM	
	C	1					5	1.28625		NM	
	C	2					6	1.28147		NM	
	D	1					7	1.29885		NM	
	D	2					8	1.30415		NM	
	E	1					9	1.28672		NM	
	E	2					10	1.30482		NM	
0%	A	1	3.8	NM	0.720	NM	11	1.28177	1.30425	NM	Small fish; gills butchered
	A	2	4.5	NM	1.106	NM	12	1.28628	1.30584	NM	
	B	1	4.4	NM	0.874	NM	13	1.28657	1.34752	NM	
	B	2	3.9	NM	0.1678	NM	14	1.28936	1.30304	NM	
	C	1	4.2	NM	0.832	NM	15	1.29016	1.29848	NM	
	C	2	4.5	NM	1.219	NM	16	1.28589	1.30591	NM	
	D	1	4.5	NM	1.067	NM	17	1.28638	1.30309	NM	
	D	2	3.8	NM	0.704	NM	18	1.28911	1.30114	NM	
	E	1	4.0	NM	0.757	NM	19	1.28640	1.29589	NM	
	E	2	4.3	NM	0.920	NM	20	1.29567	1.31601	NM	
10%	A	1	*	TE	0.797	JKS	21	1.27650	1.29071	NM	TE = Techerur 1
	A	2	*	TE	0.897	AK	22	1.27631	1.29013	NM	
	B	1	4.0	NM	0.616	NM	23	1.27663	1.28906	NM	
	B	2	4.6	NM	0.990	NM	24	1.29547	1.31274	NM	
	C	1	4.4	NM	0.919	NM	25	1.28184	1.30647	NM	
	C	2	4.0	NM	0.939	NM	26	1.30527	1.32419	NM	
	D	1	4.2	NM	0.934	NM	27	1.28646	1.30312	NM	
	D	2	3.4	NM	0.647	NM	28	1.30468	1.31841	NM	
	E	1	4.0	NM	0.776	NM	29	1.30493	1.32043	NM	
	E	2	3.6	NM	0.548	NM	30	1.28916	1.29830	NM	

* length not measured for fish 10% A 1 and 2

AK-7-14-09

Project: <u>TVA Fly Ash</u>							Test Initiation Date: <u>6-26-09</u> Time: <u>1330</u>				
Site ID: <u>EMR-EL-4F</u>											
Laboratory: <u>ERDC</u>							Test Date(s): <u>7-6-09</u> Time: <u>0900</u>				
Test Species: <u>Pimephales promelas, juvenile</u>							Page <u>2</u> of <u>2</u>				
Exposure duration: 10 day							Environmental chamber temperature: <u>20</u>				
Treatment	Repl.	Fish	Whole fish length		Whole fish weight		Liver weight				Comments
			CM #	Initials	g	Initials	Vial #	Vial weight (g)	Vial + dry weight (g)	Initials	
50%	A	1	4.2	NM	0.905	NM	31	1.28140	1.29535	NM	
	A	2	4.7	NM	1.220	NM	32	1.28537	1.31174	NM	
	B	1	4.6	NM	1.041	NM	33	1.30493	1.33056	NM	
	B	2	4.3	NM	0.976	NM	34	1.27708	1.29443	NM	
	C	1	4.3	NM	1.057	NM	35	1.27691	1.28765	NM	
	C	2	4.2	NM	0.867	NM	36	1.27583	1.29512	NM	
	D	1	4.3	NM	0.892	NM	37	1.28937	1.30318	NM	
	D	2	4.1	NM	0.786	NM	38	1.28593	1.30412	NM	
	E	1	4.1	NM	0.762	NM	39	1.28616	1.30350	NM	
	E	2	4.5	NM	1.028	NM	40	1.28945	1.31138	NM	
100%	A	1	4.4	NM	1.019	NM	41	1.29524	1.31421	NM	
	A	2	4.2	NM	1.063	NM	42	1.30503	1.32934	NM	
	B	1	4.6	NM	1.181	NM	43	1.28962	1.32140	NM	
	B	2	4.5	NM	1.135	NM	44	1.30475	TE	NM	TE = tank error
	C	1	4.0	NM	0.780	NM	45	1.27613	1.28476	NM	
	C	2	3.8	NM	0.740	NM	46	1.28653	1.30591	NM	
	D	1	3.9	NM	0.708	NM	47	1.29540	1.30834	NM	
	D	2	4.1	NM	0.842	NM	48	1.28141	1.31312	NM	
	E	1	4.4	NM	1.007	NM	49	1.28569	1.30521	NM	
	E	2	4.3	NM	0.953	NM	50	1.28110	1.29418	NM	

AK-7-14-09

TEST TERMINATION SHEET

Project: <u>TVA Fly Ash</u>				Test Initiation Date: <u>6-26-09</u> Time: <u>1400</u>			
Site ID: <u>EMR-EL-AF</u>							
Laboratory: <u>ERDC</u>				Test Date(s): <u>7-6-09</u> Time: <u>0900</u>			
Test Species: <u>Adult <i>Pimephales promelas</i></u>				Page 1 of 1			
Exposure duration: 10 day				Environmental chamber temperature: <u>20</u> <u>7-16-09</u>			

Treatment	Repl.	No. Fish	Vial Wt (g)	Vial tissue (g)	Tissue mass (g)	Initials	Comments
Control	A	5			8.71228	JB	
	B	5			3.93603	JB	
	C	5			3.00648	JB	
	D	5			2.68734	MA	
	E	5			3.49609	MA	
0%	A	3			7.45123	JB	
	B	3			1.76649	JB	
	C	3			1.91556	JB	
	D	3			1.56568	MA	
	E	3			1.29470	NM	
10%	A	3			1.31373	JB	
	B	3			1.76157	JB	
	C	3			1.30042	JB	
	D	3			1.51326	MA	
	E	3			1.76387	JB	
50%	A	3			2.08660	JB	
	B	3			1.66544	MA	
	C	3			1.62401	JB	
	D	3			2.24050	JB	
	E	3			1.18480	JB	
100%	A	3			1.54037	JB	
	B	3			1.66960	JB	
	C	3			1.74256	JB	
	D	3			1.69800	JB	
	E	3			2.16887	JB	

Acute Fish Test-96 Hr Survival

Start Date: 6/26/2009	Test ID: 1	Sample ID:
End Date: 6/30/2009	Lab ID:	Sample Type:
Sample Date:	Protocol: EPAA 91-EPA Acute	Test Species: PP-Pimephales promelas
Comments:		

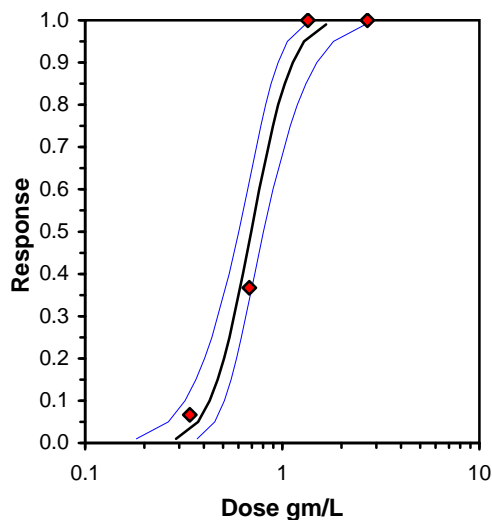
Conc-gm/L	1	2	3
0	1.0000	1.0000	1.0000
0.34	0.9000	1.0000	0.9000
0.68	0.6000	0.6000	0.7000
1.35	0.0000	0.0000	0.0000
2.7	0.0000	0.0000	0.0000

Conc-gm/L	Transform: Arcsin Square Root							Number Resp	Total Number
	Mean	N-Mean	Mean	Min	Max	CV%	N		
0	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	3	0	30
0.34	0.9333	0.9333	1.3034	1.2490	1.4120	7.219	3	2	30
0.68	0.6333	0.6333	0.9211	0.8861	0.9912	6.586	3	11	30
1.35	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	3	30	30
2.7	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	3	30	30

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)	0.85668	0.764	1.11758	0.44421
Equality of variance cannot be confirmed				

Maximum Likelihood-Probit											
Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	6.10444	1.02371	4.09798	8.11091	0	4.19071	5.99146	0.12	-0.1582	0.16382	5
Intercept	5.96574	0.2435	5.48848	6.44301							

Point	Probits	gm/L	95% Fiducial Limits	
EC01	2.674	0.28887	0.18187	0.37049
EC05	3.355	0.37355	0.26385	0.45446
EC10	3.718	0.42841	0.32063	0.5085
EC15	3.964	0.46991	0.36484	0.54983
EC20	4.158	0.50574	0.40349	0.58622
EC25	4.326	0.53865	0.43909	0.62048
EC40	4.747	0.63139	0.53753	0.72372
EC50	5.000	0.6947	0.60114	0.80177
EC60	5.253	0.76436	0.6666	0.89582
EC75	5.674	0.89596	0.77846	1.09532
EC80	5.842	0.95426	0.82424	1.19155
EC85	6.036	1.02702	0.87904	1.31739
EC90	6.282	1.12651	0.95076	1.49861
EC95	6.645	1.29196	1.06411	1.82062
EC99	7.326	1.67066	1.30564	2.64061



INITIAL WEIGHT DETERMIANTION SHEET

Project: *TVA Fly fish*

Laboratory: *ERDL*

Test Species: *Larval *Pomphelus promelas**

Exposure duration: *10-21*

Pan #	# animals on pan	Pan weight (g)	Pan & animal dry weight (g)	Comments
1	10	0.10085	0.10326	
2	10	0.10285	0.10404	
3	10	0.10229	0.10361	
4	10	0.08555	0.08762	
5	10	0.10290	0.10579	
Initials	<i>AK</i>	<i>LC</i>	<i>AK</i>	

TIME

Instrument Calibration Log

Date	Instrument Type	Instrument Number	Test or Study	ation Type	Calibration Successful?	Slope	Comments
6/24/09 11:00	Calibration	model 835	TVA	D.O.	yes	0.77	MA
6/24/09 11:00	Calibration	PH 340i	TVA	P.H.	yes	-59.3	MP
6/27/09 13:00		PH 340i	TVA	P.H.	yes	58.1	AK
		Model 13300i	TVA	T.O.	yes	97.5%	AK
6/28/09 1300	Calibration	model 13300i	TVA	D.O.	yes	0.84	
6/28/09 1310	Calibration	model 340i	TVA	pH	yes	57.9	
6/29/09 8:00		model 835	TVA	DO	yes	0.73	MA
6/29/09 8:00		PH 340i	TVA	PH	yes	58.8	MA
6/30/09 9:00		model 835	TVA	DO	yes	0.71	MA
6/30/09 9:00		PH 340i	TVA	PH	yes	58.1	MA
7/1/09 8:30		model 835	TVA	D.O.	yes	0.76	MA
7/1/09 8:30		PH 340i	TVA	PH	yes	58.5	MA
7/2/09 8:30		model 835	Range finder	D.O.	yes	0.75	MA
7/2/09 8:30		PH 340i	Range finder	P.H.	yes	58.8	MA
7/3/09 9:05		Oxi 330i	TVA	D.O.	yes	0.86	JS
7/3/09 9:05		PH 340i	TVA	P.H.	yes	52.0	JS
7/4/09 1108	DO	Ox 330i	TVA	D.O.	yes	0.84	AK
7/4/09 1110	PH	PH 340i	TVA	PH	yes	52.4	AK
7/5/09 1124	DO	Ox 330i	TVA	DO	yes	0.75	AK
	PH	PH 340i	TVA	PH	yes	52.4	AK

Appendix G: Elutriate Bioassay Water Quality Parameters

Appendix G. Elutriate Bioassay Water Quality Parameters

Summary of water quality parameters measured during the 10 days the larval and juvenile *Pimephales promelas* exposures. Means and one standard deviation from the mean are provided. Numbers in parentheses represent the minimum and maximum values.

Site ID	Concentration	Temperature (° C)	pH (SU)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Ammonia (mg/L)	Alkalinity (mg/L)	Hardness (mg/L)
Control	NA	20.1 ± 0.2 (19.7 – 20.6)	8.12 ± 0.14 (7.91 – 8.47)	274 ± 7 (260 – 280)	8.2 ± 0.8 (6.9 – 9.5)	(< 1 – 1)	110	100
REF-WA-LF	0%	20.0 ± 0.4 (19.2 – 20.6)	7.79 ± 0.20 (7.57 – 8.21)	97 ± 6 (90 – 110)	8.4 ± 0.9 (6.8 – 9.5)	(< 1 – 1)	64	20
EMR-EL-LF	10%	20.0 ± 0.3 (19.4 – 20.5)	7.62 ± 0.26 (7.12 – 8.02)	96 ± 5 (90 – 100)	8.3 ± 0.8 (6.6 – 9.5)	(< 1 – 1)		
	50%	20.1 ± 0.4 (19.6 – 20.8)	7.63 ± 0.20 (7.20 – 7.94)	114 ± 6 (100 – 120)	8.1 ± 0.9 (6.4 – 9.3)	(< 1 – 1)		
	100%	20.0 ± 0.3 (19.6 – 20.7)	7.74 ± 0.17 (7.30 – 7.95)	129 ± 9 (120 – 140)	8.1 ± 1.0 (6.6 – 9.4)	(< 1 – 1)	100	22
SLC-EL-LF	10%	20.4 ± 0.3 (20.0 – 20.6)	7.69 ± 0.14 (7.52 – 7.95)	114 ± 5 (110 – 120)	7.7 ± 1.0 (6.0 – 9.4)	(< 1 – 1)		
	50%	20.1 ± 0.4 (19.5 – 20.8)	7.79 ± 0.12 (7.54 – 8.05)	177 ± 19 (110 – 190)	8.2 ± 1.1 (6.4 – 9.8)	(< 1 – 1)		
	100%	20.1 ± 0.5 (19.4 – 21.0)	8.09 ± 0.12 (7.91 – 8.43)	269 ± 12 (250 – 290)	8.4 ± 0.9 (6.4 – 9.9)	(< 1 – 1)	160	76

Site ID	Concentration	Temperature (° C)	pH (SU)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Ammonia (mg/L)	Alkalinity (mg/L)	Hardness (mg/L)
Control	NA	20.6 ± 0.3 (20.2 – 21.1)	8.12 ± 0.14 (7.91 – 8.47)	287 ± 7 (280 – 300)	9.0 ± 0.7 (7.4 – 10.0)	(< 1 – 2)	110	100
REF-WA-AF	0%	20.1 ± 0.7 (18.9 – 20.8)	7.61 ± 0.17 (7.38 – 7.88)	104 ± 11 (90 – 120)	8.9 ± 1.3 (4.2 – 10.0)	(< 1 – 2)	64	20
EMR-EL-AF	10%	19.9 ± 0.6 (18.7 – 20.5)	7.57 ± 0.23 (7.16 – 8.04)	104 ± 11 (90 – 120)	9.2 ± 0.6 (8.2 – 9.9)	(< 1 – 2)	100	22
	50%	20.2 ± 0.8 (18.6 – 21.0)	7.62 ± 0.15 (7.40 – 8.00)	120 ± 13 (100 – 140)	9.1 ± 0.7 (7.4 – 10.0)	(< 1 – 1)		
	100%	20.0 ± 0.7 (18.9 – 20.7)	7.65 ± 0.22 (7.14 – 8.05)	136 ± 13 (120 – 160)	9.0 ± 0.5 (7.9 – 9.5)	(< 1 – 2)		

Appendix H: Histological Examination of Fish Gills

**Evaluation of Metals Release from Oxidation of Fly Ash during
Dredging of the Emory River, TN**

Gill Histology

August 12, 2009

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1. INTRODUCTION

Herein we report specifically on the gill histopathology resulting following 10 day exposures of juvenile fathead minnows (*Pimephales promelas*) to zero or 100% elutriate from the Emory River (EMR-EL).

2. METHODS

2.1 Exposure

For full description of fish testing methods please refer to section 6. Fish were anesthetized (Tricaine methanesulfonate, MS-222), and gills were carefully removed using micro-dissection scissors assisted by dissecting microscopes. Gills were imaged and immediately placed into 10 ml Bouin's Solution (Sigma HT10132-1L) in 20 ml glass scintillation vials. Specimens were shipped overnight to the Department of Pharmacology at the University of Mississippi (Oxford, MS, USA) for gill histopathology.

2.2 Gill Histopathology

After fixation in Bouin's solution for ~24 hrs at 4°C, gills were rinsed in 1X PBS 2 times for 2 hr and dehydrated in a gradient of 70, 80, and 90% ethanol for 3 hr each and 95 and 100% ethanol for 1.5 hr each. Gills were then cycled through Clearify (American Master Tech Scientific Inc., Lodi, CA) rinses for 2 hr and 3 hr followed by paraffin embedding at 55°C for 50 min and another cycle for 3 hr (Leica TP1020). Gills were removed from cassettes and positioned into a well of a 6-well plate for further block embedding. Embedded gills were stored at -20°C.

Efforts were made to position the gills to facilitate sectioning oriented cross sectionally to the filaments and transverse to the gill. Five µm sections were prepared with an Olympus Cut 4055. Three adjacent slide sets (A-C) were generated to allow for additional toxicity testing or replicate staining if necessary.

To determine morphological changes in the gill filaments or lamellae, hematoxylin and eosin (H&E) staining was performed on the slides (set A). Tissues were dewaxed with Clearify and then rehydrated through a series of decreasing ethanol rinses (100 I, 100 II, 95, 90, 80 and 70%). Tissues were then stained with Harris's hematoxylin and eosin Y. Sections were visualized and photographed with an Olympus BX40 and Optronics camera at 630x magnification.

Filament width was determined by measuring across the filament between 2 adjacent lamellae. When possible, filament width was measured 1 to 5 times per filament on 5 different filaments per fish (6 - 25 measurements per gill; n = 5 – 7 fish/treatment). Qualitative observations of other gill pathologies were noted as described by Bernet et al., 1999 and Costa et al., 2009.

3. RESULTS

Gills from 10 individuals exposed to either 0 or 100% Emory River elutriate were fixed and sectioned for histopathological analysis. Once sectioning was complete, a number of the fish were either not positioned properly to visualize cross sections of filaments and lamellae or had been damaged during processing (Table 1).

Figure 1 shows an overview of a representative gill section and subsequent magnifications of that section. The diagram in panel C shows how measurement of filament width was determined. When possible, this was measured up to five times per filament. However, because the widths naturally changed across the filament and in some sections the entire length of a filament was not in the plane of the section, it was determined a more consistent measurement was found at the base of the filament near where it attached to the gill arch. Base filament widths were measured for 2-5 filaments per fish ($n = 7$ and 5 , for control and 100%, respectively). There was a relatively high interindividual variability in filament width and the fish with the highest and lowest average widths were both in the control group (Figure 2A). When averaged for all the fish within treatment there was not a statistically significant ($p > 0.05$, Student's T-test) increase in filament width in the 100% elutriate-treated fish.

An increase in gill filament (padding) width has previously been reported in zebrafish exposed to silver nitrate, copper sulfate, and nanocopper for 24 or 48 hr (Griffitt et al., 2009) and yellow perch chronically exposed to metals in the wild (Levesque et al., 2003). Decreased blood-water exchange is the pathophysiology presumed to be associated with increased epithelial width. In contrast, juvenile pike from a reference lake had significantly thicker gill filaments compared to those exposed to Key Lake uranium milling effluent (Kelly and Janz, 2009).

Both Bernet et al., 1999 and Costa et al., 2009 have utilized a weighted indices approach to assess gill histological biomarkers of environmental effect. The weighted index includes an importance factor (w) of 1, 2 or 3 on a scale from minimal, moderate to marked pathological importance (Bernet et al., 1999). Sections were investigated for signs of epithelial lifting ($w=1$), desquamation (1), lamellae deformation (1), lamellae fusion (1), chloride cell hypertrophy (2) and epithelial hyperplasia (2). Single incidences of pathologies were not considered positive, rather an abnormality had to be persistent across filaments to be considered positive. Figure 3 shows some examples of these lesions and Table 1 lists the lesions noted per sample. As shown a high number of gills could not be definitively classified with regard to lesions because the gill filaments/lamellae were not in focus across the $5\ \mu\text{m}$ sections. Gill is a particularly hard organ to section because they are curved, and thus, it is very difficult to get the arches to lay flat (especially on a small fish like fathead minnows) as shown in Figure 1A. In future studies, we would recommend dissecting the two halves of the gill apart so they can be embedded separately and potentially yield higher n numbers for histopathology and statistical evaluation. In addition, thinner sections ($3\ \mu\text{m}$) may yield clearer photos. Lesions noted in fish from this study included fused and deformed lamellae,

desquamation, and epithelial hyperplasia. In summary, higher sample numbers will be needed to be able to statistically compare histological indices between treatment fish.

Table 1. Sample numbers, analyses conducted and pathologies noted.

ERDC ID	UM ID	Filament Width Measured	Pathology Scored	Pathology Noted
0 % Controls				
EMR-EL-AF-A-0-1	1A	Yes	Yes	Lamellar Fusion
EMR-EL-AF-A-0-2	1B	No	No	
EMR-EL-AF-B-0-1	2A	Yes	Yes	None - normal
EMR-EL-AF-B-0-2	2B	No	No	
EMR-EL-AF-C-0-1	3A	Yes	No	
EMR-EL-AF-C-0-2	3B	Yes	No	
EMR-EL-AF-D-0-1	4A	No	No	
EMR-EL-AF-D-0-2	4B	Yes	Yes	
EMR-EL-AF-E-0-1	5A	Yes	No	
EMR-EL-AF-E-0-2	5B	Yes	Yes	
100 % Elutriate				
EMR-EL-AF-A-100-1	16A	Yes	Yes	Desquamation
EMR-EL-AF-A-100-2	16B	Yes	Yes	
EMR-EL-AF-B-100-1	17A	Yes	Yes	Desquamation, Deformed and Fused Lamellae
EMR-EL-AF-B-100-2	17B	No	No	
EMR-EL-AF-C-100-1	18A	No	No	
EMR-EL-AF-C-100-2	18B	Yes	Yes	
EMR-EL-AF-D-100-1	19A	Yes	Yes	Epithelial Hyperplasia
EMR-EL-AF-D-100-2	19B	No	No	
EMR-EL-AF-E-100-1	20A	No	No	
EMR-EL-AF-E-100-2	20B	No	No	

Samples that were not measured or scored yielded sections that were not in the proper orientation for accurate histological evaluation of gill filaments or lamellae. If samples were analyzed for pathology, but there is nothing noted in the last column then no conclusive lesions were identified but also they could not be conclusively determined as normal.

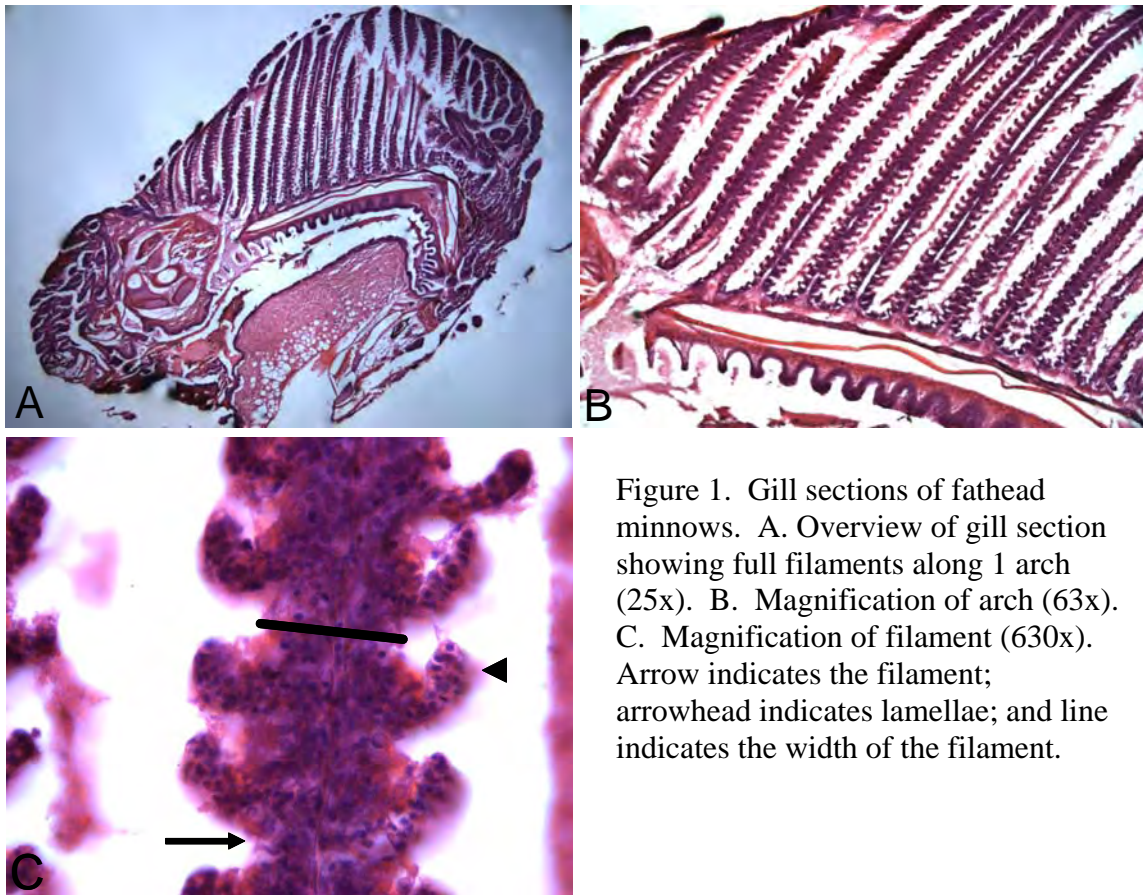


Figure 1. Gill sections of fathead minnows. A. Overview of gill section showing full filaments along 1 arch (25x). B. Magnification of arch (63x). C. Magnification of filament (630x). Arrow indicates the filament; arrowhead indicates lamellae; and line indicates the width of the filament.

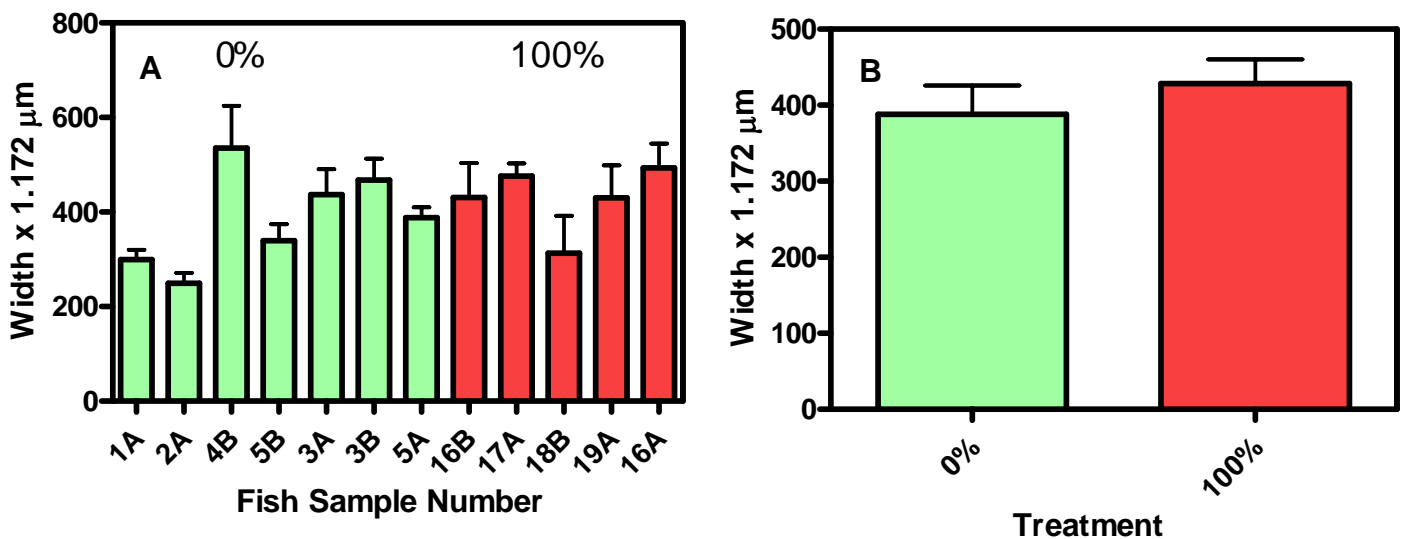


Figure 2. Gill filament widths measured at the base of the filament near the arch. A) Average widths \pm S.E. per fish ($n = 2 - 5$ filaments per fish), B) Average widths for all fish per treatment, $p > 0.05$, Student's T-test, $n = 5-7$.

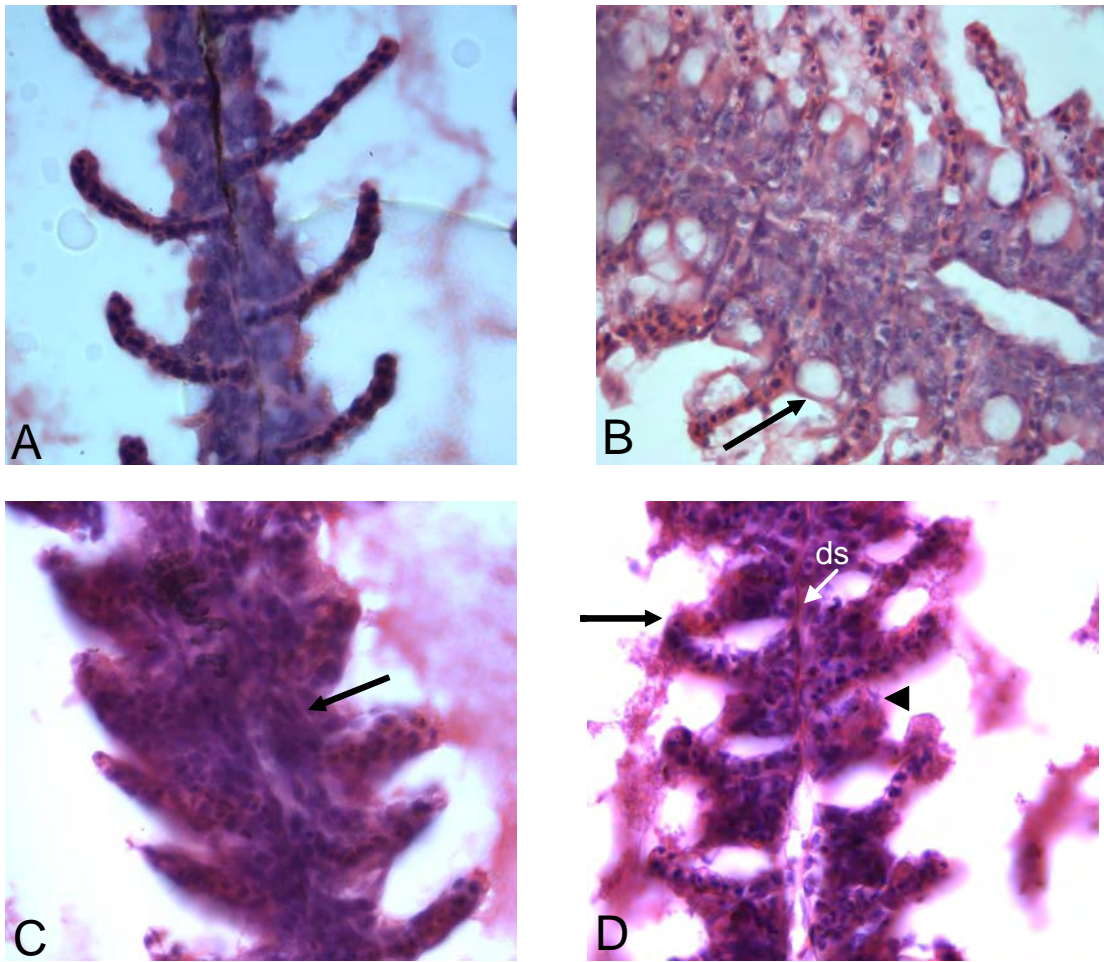


Figure 3. Gills sections of treated fish. A. Control fish showing no gross signs of toxicity. B. Control fish with potential goblet cell hyperplasia (arrow). C. Treated fish with epithelial hyperplasia (arrow). D. Treated fish with toxicities including desquamation (ds), deformed lamellae (arrow head) and lamellar fusion

Reference List

Bernet, D., Schmidt, H., Burkhardt-Holm, P., and Wahli, T. (1999). Histopathology in fish: proposal for a protocol to assess aquatic pollution. *J. Fish Dis.* **22**, 25-34.

Costa, P. M., Diniz, M. S., Caeiro, S., Lobo, J., Martins, M., Ferreira, A. M., Caetano, M., Vale, C., DelValls, T. A., and Costa, M. H. (2009). Histological biomarkers in liver and gills of juvenile *Solea senegalensis* exposed to contaminated estuarine sediments: a weighted indices approach. *Aquat. Toxicol.* **92**(3), 202-212.

Griffitt, R. J., Hyndman, K., Denslow, N. D., and Barber, D. S. (2009). Comparison of molecular and histological changes in zebrafish gills exposed to metallic nanoparticles. *Toxicol. Sci.* **107**(2), 404-415.

Kelly, J. M., and Janz, D. M. (2009). Assessment of oxidative stress and histopathology in juvenile northern pike (*Esox lucius*) inhabiting lakes downstream of a uranium mill. *Aquat. Toxicol.* **92**(4), 240-249.

Levesque, H. M., Dorval, J., Hontela, A., Van Der Kraak, G. J., and Campbell, P. G. (2003). Hormonal, morphological, and physiological responses of yellow perch (*Perca flavescens*) to chronic environmental metal exposures. *J Toxicol. Environ. Health A* **66**(7), 657-676.

Appendix I: Juvenile Mussel Toxicity

**Evaluation of Elutriate Toxicity of Fly Ash Released during Dredging of the Emory River,
TN, to Juvenile Mussels (fatmucket, *Lampsilis siliquoidea* and rainbow mussels, *Villosa iris*)**

Mussel Toxicity

September 4, 2009

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1. INTRODUCTION

Fly ash was released to the Emory River, TN from the Tennessee Valley Authority Kingston Fossil Plant (USEPA 2009, TVA 2009). The environmental cleanup of this spill will most likely result in the removal of over 5 million cubic yards of fly ash from the river and surrounding areas in connection with recovery and remediation efforts. The impact of this release on the river ecosystem is currently unknown. The objective of this study was to evaluate the potential toxicity of resuspended fly ash to juvenile freshwater mussels in 10-d static-renewal elutriate toxicity test following the method following general procedures outlined in ASTM (2009a) for conducting water toxicity tests with juvenile mussels.

2. METHODS

2.1. *Test 1 with newly transformed juvenile mussels.*

Fly ash was collected from two sites (Emory River and Sluice channel). Elutriates were prepared by U.S. Army Engineer Research and Development Center (ERDC) to represent water surrounding the dredge and released from the fly ash storage/dewatering facility. Two 8-L 100% elutriate samples (EMR-EL-MS and SLC-EL-MS) and 20-L upstream reference water (EMR-WA-MS, as dilution water for two elutriate tests) were delivered to U.S. Geological Survey, Columbia Environmental Research Center (CERC) on June 25, 2009 and kept at 4°C. These water samples were splits of the same water samples used to conduct the elutriate toxicity tests with fathead minnows (*Pimephales promelas*) by the ERDC. Newly transformed (1-week-old) fatmucket (*Lampsilis siliquoidea*) were obtained from the laboratory cultures at Missouri State University in Springfield, MO. Juvenile mussels (0.35 ± 0.03 mm shell length, $n=20$) were acclimated to CERC well water (hardness 280 mg/L as CaCO_3 , pH 8.0) and test temperature (20°C) for 48 h before starting tests. During the acclimation period, the mussels were fed a non-viable algal mixture (Wang et al. 2007) twice daily.

Toxicity test conditions are summarized in Table 1. Three elutriate concentrations (100, 50, 10% elutriate) were prepared by diluting the 100% elutriate with reference site water (0% elutriate). At the beginning of the test, ten mussels were transferred impartially into each of five replicate 300-ml glass beakers containing about 200 ml of water or elutriate. The beakers were placed in a water bath at $20 \pm 1^\circ\text{C}$. Test duration was 10 d. Mussels were fed 2 ml of the non-viable algal mixture once daily. About 75% water was renewed on Days 3 and 7. Water quality characteristics (pH, dissolved oxygen, hardness, alkalinity, conductivity, ammonia) were measured from each treatment at the beginning and end of tests following standard methods (APHA 2005). Dissolved oxygen was also measured before each water renewal. About 40 ml of water samples for potential chemical analysis were collected from each treatment at the beginning of tests, and was shipped at about 4°C in a cooler overnight to ERDC. Survival of mussels (defined as foot movement during a five-minute observation period) was determined at the end of the tests. The acceptability criterion for a toxicity test was $\geq 80\%$ control survival (ASTM 2009a).

A subset of test organisms used in toxicity tests was evaluated by conducting an acute static-renewal toxicity test with a reference toxicant (reagent-grade NaCl) following standard test

methods (ASTM 2009). Mussels will be acclimated to ASTM hard water (hardness 160-180 mg/L as CaCO₃; ASTM 2009b) for 48 h before the start of the reference test. The test conditions for reference toxicant test are summarized in Table 2.

The statistical difference in mean survival among four elutriate concentrations (0, 10, 50, and 100% elutriate) were determined by analysis of variance (ANOVA) with mean comparison made by one-tailed Dunnett's test (USEPA 2002) with TOXSTAT[®] software (WEST 1996). The level of statistical significance was set at $p \leq 0.05$. Median effective concentrations (EC50s) for survival were calculated using a Probit model (USEPA 1993). If the data did not meet the requirements of the Probit model, either a Spearman-Kärber or trimmed Spearman-Kärber method was used (USEPA 1993).

2.2. Test 2 with 5-month-old juvenile mussels.

Test 2 was conducted because Test 1 conducted with newly transformed fatmucket juveniles failed due to high mortality in well water control (100% mortality) and site water control (70% mortality) at the end of 10-d tests. Survival of the newly transformed fatmucket juvenile mussels was only 85% at Day 4 in the reference toxicant test ($\geq 90\%$ survival is the acceptability requirement for a 4-d acute test; ASTM 2009a). The ERDC recreated the two new preparations of the elutriate samples that were sent to the CERC on July 28, 2009 for retesting. The test conditions were similar to those described for Test 1, with following exceptions.

- (1) Because no young juvenile mussels were available at that time, about 5-month-old rainbow mussels (*Villosa iris*) were used in Test 2. The juveniles were obtained from the laboratory cultures at CERC (the batch of mussels was originally obtained from the laboratory cultures at Virginia Department of Game and Inland Fisheries, Marion, VA).
- (2) The mussels had a large range of size (1.9 to 5.7 mm, mean 3.7 ± 0.9 mm, $n=43$). These older juvenile mussels were primarily filter feeders (similar to adult mussels) using their gills to remove suspended particles from the water column. Specifically, older mussels tend to exhibit less frequent food movement compared to younger mussels. In contrast, newly transformed juveniles are primarily foot feeding (obtaining food using cilia lining the surface of the foot; ASTM 2009a). Hence, the older mussels tend to move their foot out of shell less often than the newly transformed juveniles. Therefore, heartbeat was used to determine the survival if no foot movement was observed (ASTM 2009a).
- (3) Juvenile mussels were acclimated to the reference site water (the dilution water) for 48 h before starting tests. A subset of mussels was also acclimated in the CERC well water for organisms evaluated in the CERC well water control treatment.
- (4) Mussels were fed 2 ml of the non-viable algal mixture twice daily (4 ml once daily at weekend).
- (5) Test organisms in each test beaker were transferred to a clean beaker containing newly prepared control or elutriate water on Day 7.
- (6) Because of limited number of juvenile mussel available for testing, each treatment included four replicates in elutriate tests and 2 replicates in NaCl reference toxicant treatment.

3. RESULTS

3.1. *Test 1 with newly transformed juvenile mussels.*

The water quality characteristics were consistent during the exposures (Table 3). Concentrations of dissolved oxygen were higher than 5.8 mg/L and concentrations of total ammonia were low during the 10 day test (Table 3). The 10-d control survival was low: 0% in well water control and 30% in site water (0% elutriate, Table 3). The 96-h survival in the NaCl reference toxicant test was 85% (Table 4), below the test acceptability criterion of $\geq 90\%$ control survival (ASTM 2009a).

3.2. *Test 2 with 5-month-old juvenile mussels.*

The water quality characteristics were consistent during the exposure concentrations (Table 3). Concentrations of dissolved oxygen were higher than 5.9 mg/L and concentrations of ammonia were low during the 10 day test (Table 3). The survival based on heartbeat was $\geq 95\%$ in well water control, reference site waters (Table 3), and in the ASTM control water in the reference toxicant test (Table 4). The 96-h LC50 for NaCl was 3.5 g/L, which was slightly higher than 96-h EC50s for NaCl obtained from the tests with newly transformed juvenile mussels or up to 2-month-old mussels ($EC_{50} < 3.0$ g/L based on foot movement, unpublished data). The 10-d survival based on foot movement or heartbeat was not significantly different between site water (0% elutriate) and any elutriate concentrations for the two elutriate samples, except for 100% elutriate from the sample collected in Sluice channel, where significantly lower percentage of the mussels were observed with foot movement compared to mussels in reference site water (Table 3).

4. Discussion

Test 1 with newly transformed juvenile mussels failed due to poor survival in the control water or in the reference site water at the end of the 10-d test. The 96-h reference toxicant test also failed due to low control survival in ASTM hard water. In addition, the same batch of juvenile mussels held in a mussel culture system at CERC died off at the same period of the elutriate tests. These results indicate that a bad batch of newly transformed fatmucket juveniles was used in Test 1. These data are therefore not considered valid for assessing the toxicity for the fly ash material.

Test 2 with 5-month-old rainbow mussels were successfully completed with acceptable control survival. Concentrations of up to 100% elutriate from two samples did not affect the mussel survival (heartbeat) in the 10-d exposure. Foot movement is not a reliable indicator for control survival of old mussels because older mussels less frequently move their foot out of their shell compared to younger mussel. However, the low percentage of surviving mussels with foot movement in the 100% elutriate from Sluice channel indicate that exposure to the 100% of this elutriate adversely affected mussel behavior. Older juvenile mussels, like adult mussels, are able to close their shells to avoid exposures (ASTM 2009a). Because of large size and variation in size of the rainbow mussels and short test period, potential effect of exposure to elutriates on the growth of mussels was not determined in this test.

The USGS CERC laboratory conducted 28-d whole-sediment toxicity tests with fly ash collected from Emory River with the amphipod (*Hyaella azteca*) and two mussel species (about 3-month-old rainbow mussel or wavy-rayed lampmussels (*Lampsilis fasciola*)). Methods used to conduct these whole-sediment toxicity tests were in basic accordance with methods outlined in ASTM (2009a,c). Both species of mussels exhibited 100% survival (foot movement) after 28-d exposures to the fly ash sample. In contrast 28-d survival of amphipods in the fly ash sample was significantly lower than the amphipod exposed to a control sediment. Analyses of the physical and chemical characteristics of the ash sample and analyses of growth of amphipods and mussels at the end of the 28-d exposures are ongoing.

Table 1. Summary of conditions for fly ash elutriate toxicity tests with juvenile mussels (Fatmucket, *Lampsilis siliquoidea*; rainbow mussel, *Villosa iris*) in basic accordance with ASTM (2009a)

Species	Fatmucket (FM) or rainbow mussel (RM)
Test Type	Static renewal
Test Duration	10 d
Temperature	Mean: 20°C
Light Quality	Ambient laboratory
Light Intensity	10-20 uE/m ² /s
Photoperiod	16L:8D
Test Chamber Size	300 ml beakers
Test Solution Volume	200 mL
Renewal of Overlying water	About 75% water renewal on Days 3 and 7 in FM test; 75% renewal on day 3 and 100% water renewal on Day 7 (with replacement of exposure beakers) in RM test
Age of Test Organisms	Newly transformed (1-week-old) juvenile FM; about 5-month-old RM
No. Organisms per Chamber	10
No. Replicates	5 for FM, 4 for RM
Feeding Regime	FM: 2 ml of algal mixture once daily; RM: 2 ml of algal mixture twice daily
Test Chamber Cleaning	Transfer mussel to clean beakers containing exposure water on Day 7
Test Solution Aeration	None
Dilution Water	Reference site water
Test Concentrations	100%, 50%, 10%, 0% (dilutions prepared with site water) and CERC well water
Endpoint	Survival
Sampling and hold time	1 d for FM test, 3 d for RM test
Water quality	pH, dissolved oxygen, hardness, alkalinity, conductivity, ammonia were measured at the beginning and end of tests Dissolved oxygen was measured on Days 3 and 7
Test Acceptability Criterion	≥ 80% survival in control

Table 2. Summary of conditions for conducting reference toxicant test with juvenile mussels (fatmucket, *Lampsilis siliquoidea*; rainbow mussel, *Villosa iris*) in basic accordance with ASTM (2009a)

Test species:	Fatmucket (FM) or rainbow mussel (RM)
Test chemical:	Sodium chloride (reagent-grade NaCl)
Test type:	Static renewal
Test Duration:	96 h
Temperature:	20°C
Light quality:	Ambient laboratory light
Light intensity:	200 lux
Photoperiod:	16L:8D
Test chamber size:	50 ml
Test solution volume:	30 ml
Renewal of solution:	After 48 h
Age of test organism:	About 1-week-old FM, about 5-month-old RM
Organisms/beaker:	5
Replicate number:	4 in FM test, 2 in RM test (limited RM available)
Feeding:	No feeding
Chamber cleaning:	None
Aeration:	None
Dilution water:	Reconstituted ASTM hard water (160-180 mg/L as CaCO ₃ ; ASTM 2009b)
Dilution factor:	0.5
Test concentration:	0, 0.5, 1, 2, 4, and 8 g NaCl/L
Chemical residues:	Salinity and conductivity at each NaCl concentration measured at the beginning and the end of test
Water quality:	Dissolved oxygen, pH, hardness, and alkalinity were determined at the control, medium, and high concentrations of chemicals at the beginning and the end of test
Endpoint:	Survival (foot movement within 5 min in FM test, foot movement and heartbeat in RM test)
Test acceptability criterion:	≥90% control survival

Table 3. Water quality characteristics (test day 0 and 10) and survival of newly transformed fatmucket (*Lampsilis siliquoidea*) and 5-month-old rainbow mussel (*Villosa iris*) in 10-d static-renewal tests with fly ash elutriates diluted by reference site water (0%).

Test	Species (age)	Site ID	Concentration	pH	Conductivity (µS/cm)	Alkalinity	Hardness	Ammonia (mg TN/L)	Survival (%; SD, n=4)			
						(mg/L as CaCO ₃)			(foot movement)	(heartbeat)		
1	Fatmucket (1 week old)	CERC well water	Control	8.0/8.6	597/664	136/256	300/292	0.08/0.11	0 (0)	ND ^a		
		EMR-EL-MS (2)	0%	7.7/7.7	99/123	28/38	22/36	0.06/0.32	30 (27)	ND		
			10%	7.8/7.9	93/124	30/34	24/38	0.07/0.05	40 (27)	ND		
			50%	7.8/7.8	101/140	36/40	34/44	0.20/0.14	28 (4.5)	ND		
			100%	7.9/7.9	115/162	40/50	40/54	0.03/0.17	38 (8.4)	ND		
		SLC-EL-MS (2)	0%	7.7/7.7	99/123	28/38	22/36	0.06/0.32	30 (27)	ND		
			10%	7.7/7.9	102/150	40/38	30/50	0.06/0.05	42 (15)	ND		
			50%	7.9/8.0	173/208	40/54	66/98	0.03/0.15	74 (15)	ND		
			100%	8.0/8.0	243/276	70/72	102/108	0.04/0.05	86 (13)	ND		
		2	Rainbow mussel (5 month old)	CERC well water	Control	8.6/8.6	625/637	260/260	300/280	0.11/0.18	73 (19)	95 (10)
				EMR-EL-MS (2)	0%	7.2/8.0	84/107	22/40	40/32	0.05/0.19	88 (15)	100 (0)
					10%	7.3/7.6	120/115	36/40	40/34	0.08/0.19	78 (21)	100 (0)
50%	7.6/7.6				119/125	36/46	48/36	0.06/0.16	85 (19)	95 (10)		
100%	7.5/8.0				151/178	48/54	60/66	0.04/0.22	83 (10)	90 (0)		
SLC-EL-MS (2)	0%			7.2/8.0	84/107	22/40	40/32	0.05/0.19	88 (15)	100 (0)		
	10%			7.4/7.7	120/128	28/40	50/40	0.05/0.19	68 (10)	98 (5.0)		
	50%			7.4/7.9	167/177	44/40	70/60	0.06/0.15	70 (20)	90 (14)		
	100%			7.6/8.1	254/289	68/70	110/102	0.05/0.20	35 (17)*	98 (5.0)		

* Significant reduction relative to the site water (0%).

^a Not determined.

Table 4. Water quality characteristics and survival in 96-h reference toxicant (NaCl) tests with newly transformed fatmucket (*Lampsilis siliquoidea*) and 5-month-old rainbow mussel (*Villosa iris*)

Test	Species (age)	Nominal NaCL (g/L)	Measured salinity (g/L)	Dissolved oxygen (mg/L)	pH	Conductivity (μ S/cm)	Alkalinity (mg/L as CaCO ₃)	Hardness	Survival ^a (%)
1	Fatmucket (1 week old)	0	0.1/0.1	8.4/7.3	8.6/8.5	632/704	130/148	186/194	85
		0.5	0.6/0.6			1493/1588			85
		1	1.1/1.2			2360/2500			70
		2	2.1/2.2	8.4/7.3	8.6/8.5	4060/4290	130/148	186/194	85
		4	4.0/4.2			7290/7720			5
		8	8.1/8.7	8.4/7.3	8.6/8.4	13970/14890	130/148	186/194	0
2	Rainbow mussel (5 month old)	0	0.1/0.1	8.0/7.5	8.8/8.7	618/741	140/142	180/188	100
		0.5	0.6/0.7			1429/1666			100
		1	1.1/1.2			2222/2600			100
		2	2.1/2.2	8.0/7.4	/8.6	3790/4420	140/148	/188	100
		4	4.1/4.4			6840/8040			30
		8	8.1/8.8	8.0/7.1	/8.5	12970/15120	140/148	/188	0

^a Survival was based on foot movement of newly transformed mussels in Test 1 and based on foot movement or heartbeat of 5-month-old mussels in Test 2.

References List:

American Public Health Association (APHA). 2005. *Standard Methods for the Examination of Water and Waster Water*, 21st ed. American Public Health Association, Washington, DC.

American Society for Testing and Materials (ASTM). 2009a. Standard guide for conducting laboratory toxicity tests with freshwater mussels (ASTM E2455-06). *Annual Book of ASTM Standards* Volume 11.06. West Conshohocken, PA.

ASTM 2009b. Standard guide for conducting acute toxicity tests on test materials with fishes, macroinvertebrates, and amphibians (ASTM E729 92007)). *Annual Book of ASTM Standards* Volume 11.06. West Conshohocken, PA.

ASTM 2009c. Standard test method for measuring the toxicity of sediment-associated contaminants with freshwater invertebrates (ASTM E1706-05). *Annual Book of ASTM Standards* Volume 11.06. West Conshohocken, PA.

Tennessee Valley Authority (TVA). 2009. Kingston Recovery Update. Accessed on the web at: <http://www.tva.gov/kingston/index.htm>

USEPA. 1993. Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms, fourth edition. EPA/600/4-90/027F. Washington, DC.

U.S. Environmental Protection Agency (USEPA). 2002. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms, 4th ed. EPA-821-R-02-013. Washington, DC.

U.S. Environmental Protection Agency (USEPA). 2009. EPA's Response to the TVA Kingston Fossil Plant Fly Ash Release. Region 4, Southeast. Accessed on the web at: <http://www.epa.gov/region4/kingston/index.html>

Wang N, Ingersoll CG, Greer IE, Hardesty DK, Ivey CD, Kunz JL, Brumbaugh WG, Dwyer FJ, Roberts AD, Augspurger T, Kane CM, Neves RJ, Barnhart MC. 2007. Chronic toxicity of copper and ammonia to juvenile freshwater mussels (Unionidae). *Environ Toxicol Chem* 26:2048-2056.

Western EcoSystems Technology. 1996. TOXSTAT® 3.5. Cheyenne, WY, USA.

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14. ABSTRACT This report describes a study examining the effects of Kingston Fossil Plant fly ash on geochemistry, water quality, and aquatic biota relevant to the Emory River in Tennessee. It focuses on the processes specific to the changes in the fly ash chemistry and potential releases as a result of a spill that occurred on December 22, 2008 and the subsequent dredging operations to remove the fly ash from the Emory River. Fly ash from three sites including the original pile, fly ash spilled in the Emory River, and dredged fly ash from the sluice channel were evaluated to assess the potential for metal releases. Fly ash from the Emory River and sluice channel were used to prepare relevant suspensions (e.g., elutriates) to represent extreme conditions for the release, dissolution, and metal speciation changes that might occur during dredging. Advanced chemical assessment techniques were used to quantify the chemical concentrations and speciation in this system. Because multiple metals were present, biological studies were also conducted to assess the potential for toxic effects and uptake in aquatic organisms. Chemistry results from this study were compared to measurements from ongoing monitoring at the site.					
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